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# U.S. Report to FAO

Under Article XI  
of the FAO  
Constitution  
1958-60

U.S. DEPARTMENT OF AGRICULTURE  
Foreign Agricultural Service  
October 1961      Washington, D.C.



**United States  
Department of  
Agriculture**



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**REPORT**

**of the Government of the  
United States of America  
to the  
FOOD AND AGRICULTURE  
ORGANIZATION  
OF THE UNITED NATIONS  
1958-60**

**Under Article XI  
of the FAO Constitution**

**Prepared under the auspices of the  
U.S. FAO Interagency Committee**

**U.S. DEPARTMENT OF AGRICULTURE  
Foreign Agricultural Service • October 1961**

**U.S.D.A., NAL**

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## Foreword

This "Report to FAO" for the years 1958-59-60 was prepared in accord with Article XI of the FAO Constitution, which provides that each Member Nation shall communicate periodically, to the Organization, reports on the progress made toward the purpose of the Organization. All agencies of the Government that are directly concerned with the subjects covered in the Report have contributed to it. The Report was planned and prepared under the supervision of sub-committee of the U. S. FAO Interagency Committee consisting of:

Ralph W. Phillips, Chairman  
Jerome H. Perlmutter, Secretary

A. W. Anderson	Gerald H. Huffman
James P. Cavin	Arthur S. Osborne
A. C. Cline	Paul E. Quintus
L. W. Da Mours	Walter W. Sohl
Kenneth A. Haines	Hazel K. Stiebeling
R. Lyle Webster	

Those who contributed materials for the report included:

Department of Agriculture: Esther F. Batchelder, Philip S. Brown, Richard D. Butler, James P. Cavin, Faith Clark, Harold T. Cook, Callie Mae Coons, James D. Cowhig, Joseph C. Doherty, Mylo S. Downey, Louis J. Ducoff, R. S. Dyal, Hazen Gale, Kenneth A. Haines, V. L. Harper, Cannon C. Hearne, Howard L. Hill, Budd A. Holt, Gerald H. Huffman, Hal Jenkins, Carl A. Larson, Sheridan T. Maitland, L. P. McCann, J. H. McCormick, T. F. McGinty, Arthur Mead, A. J. Nichols, Robert E. Olson, Esther F. Phipard, Paul E. Quintus, George L. Robbins, William H. Rowe, Marvin M. Sandstrom, H. L. Stewart, Helen D. Turner, A. M. Vance, Robert M. Walsh, E. H. Wiecking, D. A. Williams.

Department of Health, Education, and Welfare: Bertlyn Bosley, Mary Egan, Beth Heap, Bernice Mallory, Olaf Mickelsen, Geraldine Piper.

Department of the Interior: V. G. Killin, J. W. O'Meara, S. Shapiro, James A. Slater.

Social Security Administration: Roy L. Roberts.

Department of State, International Cooperation Administration: O. L. Mimms.

Materials contributed by these persons were compiled and edited by Mr. Jerome H. Perlmutter, Secretary, Outlook and Situation Board, and Chief, Economic Reports Section, Information Division, Economic Research Service and Statistical Reporting Service, Department of Agriculture. Publication was arranged, under the aegis of the U. S. FAO Interagency Committee, through the office of Dr. Ralph W. Phillips, Director, International Organizations Division, Foreign Agricultural Service, U. S. Department of Agriculture.

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# Report of the Government of the United States of America to the FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

## 1958-60

### Introduction

The FAO Council, at its Twenty-Eighth Session in November 1957, decided that in preparing reports in accord with Article XI of the FAO Constitution for the three-year period 1955-57, Member Nations should be requested to deal with:

- (a) the most significant progress and developments during the period 1955-57 in the fields (as appropriate) of FAO's activities in regard to the three basic objectives of FAO, as set out in the preamble of the Constitution:
  - (i) raising levels of nutrition and living standards;
  - (ii) securing improvements in the efficiency of production and distribution of food and agricultural products, and
  - (iii) bettering the condition of rural populations, and
- (b) what they regard as the main problems still outstanding in such fields.

Member Governments were requested to follow these same general guidelines in the preparation of their Reports for the three-year period 1958-60.

Progress in these fields in the United States results from the activities of the Federal, State and Territorial Governments, from the activities of many state and private institutions that carry out research, educational and/or extension work, and from the activities of organizations of farmers and farm youth as well as from the efforts of the individual members of farming and other communities. Therefore, a Report such as the present one must be broad rather than detailed in scope, and it cannot do more than (a) present a general picture of the progress made in improving levels of nutrition, living standards, and efficiency of production, processing, and marketing, and bettering the conditions of rural population, and (b) indicate some of the more important actions of the Federal and State Governments, aimed at bringing about these improvements.

Many important activities of the Federal Government, and of the States,

including the Land Grant Colleges and Universities, could not be included in this brief report. Also, it has not been feasible to describe the work of many nongovernmental organizations and groups which make important contributions every year to the improvement of agriculture and to the well-being of rural peoples generally in the United States, and through these activities to the well-being of the country as a whole.



## Developments in Nutrition and Home Economics

### FOOD CONSUMPTION AND NUTRITION

#### Per Capita Food Supply

Abundant food supplies in the U. S. have continued to offer consumers a wide selection of all types of foods throughout the past 3 years. In terms of per capita quantities of broad food groups, little change has occurred, but some small but interesting shifts have occurred within these groups in items or in form. For example, the consumption of margarine now exceeds that of butter, although the total of table fats has changed little in recent years. Since 1947-49 per capita use of fats and oils has risen about 3 pounds per person, reflecting increased use of margarine, vegetable shortening, and salad oils, and a further decline in per capita consumption of butter and lard. Consumption of nonfat dry milk has increased considerably, whereas that of evaporated whole milk has declined. More and more food products, ready-to-eat or ready-to-heat, are appearing on the market as a result of developments in food technology, and are receiving wide acceptance. About a fifth of the potatoes used for food in the U. S. now go into processed forms--canned, frozen, dehydrated or become specialty products such as potato chips and sticks. Dehydrated products include granules, flakes, or chips for use in instant mashed potatoes or other quickly-prepared dishes.

Per person use of milk and cream, fresh fruits and vegetables, and potatoes and cereals declined from the levels of the immediate years after World War II. In 1958-60, consumption of red meat averaged 157 pounds (carcass weight) per person, some 9 pounds more than in 1947-49. This increase consisted of 17 pounds more beef, but less pork, veal, lamb, and mutton. Consumption of poultry was increased by about 13 pounds per person to an average of 35 pounds in 1958-60.

The nutritive value of the per capita food supply, essentially unchanged since 1957, provides about 3200 calories, per person per day measured at the retail level. It also includes 96 gm. protein, 148 gm. fat, 1.03 gm. calcium, 16 mg. iron, 7000 I. U. Vitamin A, 1.8 mg. thiamine, 2.3 mg. riboflavin, 20 mg. niacin and 105 mg. ascorbic acid.

#### Family Food Consumption and Dietary Levels

An increasing proportion of homemakers in the USA are seeking employment outside the home. A special study was made to find out whether homemakers employed outside the home (about a fourth of the total labor force) fed



their families any differently from those not so employed. Basic data for the analyses came from a dietary study made in 1955 which provides information for studying the relation of socio-economic factors to food consumption and dietary levels of population groups. Results showed that the food patterns of the two groups differed somewhat and money value of food used per person in the employed homemakers' households was generally greater than in households where homemakers were not employed. More meat, poultry, fish, and bakery products were consumed per person in households of the gainfully employed than of unemployed homemakers. Families with employed homemakers more frequently ate meals away from home and spent more for them than the other group. There was no evidence, however, of difference in adequacy of diet.

### Diets of Individuals

The nutritional status of about 4000 individuals surveyed in 39 States was found to be good, probably the best that has ever been reported of similar population groups in this country. The results of this coordinated research program were published in 1959 (Calif. Agri. Expt. Sta. Bull. 769). Although there were individuals in all age groups who could benefit from improved diets, the diets of adolescent girls were most in need of improvement. Calcium, iron, thiamine, and ascorbic acid were the nutrients in which the diets were considerably below the National Research Council's recommended dietary allowances.

### Programs To Increase Domestic Consumption

The Federal Government has placed increasing emphasis on improving diets and expanding food consumption in this country, particularly among low-income families with limited ability to purchase a nutritious diet.

The Food Stamp Plan. --The Government is currently operating pilot food stamp plans in eight areas of the country to determine the effectiveness of such a program in improving diets of needy people. The participating household purchases a specific value of food stamp coupons, roughly equivalent to its normal food expenditures; and additional stamps are issued free of charge to supplement the food budget. Families with no income receive all coupons free of charge. The total value of coupons available to each family is based on family income and size of family. The household may purchase any food with the coupons except imported items. The coupons may be used in retail grocery stores that have agreed, with the U. S. Department of Agriculture, to participate in the program.

Responsibility for the approval of needy families and for the issuance and sale of the stamp coupons is being assumed by State and local governmental units.

Direct Distribution Program. --This program of direct distribution has been suspended in areas participating in the food stamp plan, but continues to operate in other sections here and abroad. Surplus foods donated under this program (both domestic and foreign) totaled over 5,760 million pounds during the two fiscal years, 1959 and 1960. Distribution to domestic recipients

amounted to 835 million pounds in July 1960-March 1961 compared with 729 million in the same period a year earlier. This 14 percent increase was due largely to expanded distribution to needy persons in family units and reflects measures taken since January 1961 at the President's directive, to increase the variety and quantity of foods distributed to the needy in the country.

In 1960, more than 14.5 million children eating school lunches benefited from 264 million pounds of surplus foods compared with 250 million pounds distributed the previous year to 14.0 million children. Supplementary foods purchased by the Government exclusively for schools taking part in the National School Lunch Program are not included in these figures.

Donations for distribution to U. S. needy persons in family units totaled about 1,233 million pounds for the 2 fiscal years 1959 and 1960. For the first 9 months of the 1961 fiscal year (July-March) a total 477.5 million pounds was distributed, about 20 percent more than in the same period in 1960. By May 1961, 6.4 million needy persons were participating in the program. Also, about 1.5 million persons in charitable institutions in this country received donated foods.

Donations of surplus foods to needy persons abroad totaled almost 1.9 billion pounds in 1960, approximately the same as the previous year. These foods were distributed through the facilities of private U. S. welfare agencies. At the close of 1960, 20 of these agencies were taking part in the program and distributing foods to over 90 countries.

National School Lunch Program. --This program is continuing to extend its progress toward the dual objectives of improving health and well-being of the Nation's children and to expand the market for farm products. In the 1960-61 school year, 13.5 million children took part in the program, or about 5 percent more than in 1959-60. The number of meals served is estimated at 2.3 billion for the year with almost all meals meeting the "Type A" pattern--that is, a complete lunch that meets at least one-third of a child's daily nutritive requirements.

Special Milk Program. --Inaugurated in 1954, operations under this program continue to expand. In fiscal year 1960-61, more than 85,000 schools and child-care institutions will take part in the program, and serve an estimated 2.5 billion half pints of milk to children participating.

### Nutrition Surveys in Other Countries

The Interdepartmental Committee on Nutrition for National Defense conducts nutrition surveys abroad in cooperation with local personnel in the country where the survey is made. During the period 1958-60 studies were completed in Spain, Ethiopia, Peru, Ecuador, Viet Nam, Chile, Colombia, Taiwan, and Thailand; also in an outlying state, Alaska. The Committee coordinates U. S. nutrition studies in other countries; assesses findings and prepares reports and recommendations for the country concerned and interested U. S. agencies; trains indigenous personnel in survey techniques; and assists the countries concerned in establishing nutrition services to enable them to use their own resources to the best advantage. Personnel for the survey teams, consisting of biochemists, clinicians, dentists, food

technologists, and nutritionists, have been provided by 26 U. S. colleges and universities and 24 private and governmental agencies.

## Nutrition Research

Much nutrition research in the government has been focused on the role of fat in nutritional health in the past few years. In the USDA, studies involving biochemical evaluation of increasing levels of linoleic acid in ordinary diets consumed by young men are being broadened to include the effect of the type of carbohydrate and of protein on nitrogen and mineral as well as lipid metabolism. Life-span studies with animals are helping to locate sites of disordered fat metabolism under stress of dietary imbalances.

Recent studies of the U. S. Public Health Service show that unesterified fatty acids (UFA) in the blood serve as a readily available source of fuel. The blood level and rate of utilization of UFA are inversely related to the rate of carbohydrate metabolism. They are derived from the adipose tissue and can be rapidly oxidized by the heart and liver.

Preliminary tables of fatty acids in food fats, based on data in scientific literature, have been issued by the USDA, and intensive laboratory analyses are underway using chromatographic methods to obtain more reliable data on today's food fats and oils.

Nutritional advances also have been made in metabolic studies the last three years. An increasing body of evidence indicates that low levels of dietary calcium are a significant factor in post-menopausal and senile osteoporosis. Patients maintained on high levels (2.4 grams of calcium per day) generally show calcium storage with no indications of toxic effects from the high calcium intakes.

Selenium, formerly known only for toxic effects on man and animals, must now be added to the list of essential micronutrients. Selenium has been identified as an integral constituent of "Factor 3," the designation given to an unknown agent that is a protection against dietary liver necrosis in rats and against serious lesions in many other species.

Cooperative studies of USDA and Southern Region States on metabolic patterns in 7- to 9-year-old girls have provided the largest body of metabolic data available on any age group of children. The results emphasize the interdependence of nitrogen metabolism and the metabolic patterns for several minerals and B-vitamins.

Progress has been made in summarizing available nutrition research data on man. One volume giving data on heights and weights of children and youth in the USA was issued by the USDA in 1957, and another followed in 1960 on heights and weights of adults, particularly college men and women. Still another publication summarizes data on the basal metabolism of children, together with improved prediction formulae for different stages of growth through adolescence.

Revised tables of nutritive value of foods, another essential tool in nutrition research, clinical nutrition, and nutrition education, have been



issued to provide figures for new types and forms of food available in the U. S. markets. A manual of instructions for the use of punch cards for the machine tabulation of the nutritive value of diets has also been prepared.

## Nutrition Education

The need to put into practice some of the knowledge emerging from nutrition research continues to present a challenge to health workers and educators. Nutritionally poor diets in the U. S. are more likely to be the result of ignorance or indifference than of insufficient money for food. How to change food habits is a complex problem involving not only knowledge of foods and nutrition, but an understanding of all the cultural and social influences that have led to present food practices. This problem is being tackled on a broad front--through person-to-person contacts of teachers, extension workers, nutritionists, dieticians, home economists, doctors, nurses and other health workers; through mass media--press, radio and television; and through programs that involve a more indirect approach. Educational aims are channeled independently toward children, adolescents, and adults. Still other programs are directed primarily to special family groups such as the American Indians and Alaska Natives.

The importance of establishing good food habits in children has received special emphasis in recent years. At the 1960 Golden Anniversary White House Conference on Children and Youth the importance of nutrition to the health and welfare of the Nation's children were among factors considered by the 7000 participants. Recommendations from the Conference included many with nutritional implications, as reported in the Composite Report of Forum Findings.

Many communities realize the contribution the school can make to the nutrition education of children, through teacher training and use of the School Lunch Program, and the USDA Daily Food Guide in the curriculum.

The school lunch offers an unusually fine opportunity for helping to establish good food habits, especially if tied in with nutrition education in the total program of the school. Much progress is being made in the selection and training of school lunch workers in order to improve the nutritional and eating quality of the meals and thereby increase participation.

States use a part of their grant-in-aid funds, administered through the Children's Bureau, Department of Health, Education and Welfare, to employ nutritionists, offer nutrition services, and provide specialized training in nutrition. At the present time, nutrition services to mentally retarded children and their families are being further developed and extended. Special training programs for nutritionists and professional co-workers have been given, and educational materials on some of the nutritional aspects of mental retardation have been prepared for professional and lay use. Nutritionists have also been directing effort toward improving the food habits of adolescents. A number of workshops and institutes on adolescent nutrition have been held for nutrition workers, and health, education, and other community agencies have been encouraged to coordinate such efforts.

Nutrition education of adults is often included as a part of such programs

as those of the Agricultural Extension Service and Public Health agencies. For example, the Division of Chronic Disease of the U. S. Public Health Service, through its grant-in-aid funds to States, provides nutrition services for the prevention and control of heart disease, diabetes, and other chronic diseases, services for the aging, nursing home care, and coordinated home care programs. To accomplish some of these, many States now employ consultants to provide better food service to institutions that give group care.

During the past 5 years, the U. S. Public Health Service through the Division of Indian Health has been developing a program to improve the nutritional status of the American Indians and Alaska Natives. An intensive program has been started, including studies of the dietary practices and nutritional status of selected groups of Indians and Alaska Natives. Analyses of foods peculiar to Alaska Natives are providing needed data on nutritive values of foods common to this group. Nutrition education programs have been developed and extended to Indian families, not reached by other State or local services. The programs consider customary diet practices, resources, and the foods available to the Indians as a basis for improving nutritional adequacy of the diets. Educational materials which recognize the cultural practices and specific nutrition education needs have been prepared for the various Indian tribes and Eskimos. Intensive efforts have been made to improve the nutritional level of institutional feeding for hospital patients and to provide educational materials about the role of food for good health. Consultation has been provided to the Bureau of Indian Affairs, Department of Interior, for improving the diets of Indian children attending day schools and boarding schools.

A guide to the selection of a nutritionally good diet is provided by a simple leaflet prepared by the USDA. The guide is based on research findings on food consumption practices, the nutritive value of foods and their contribution to diets. Presented in terms of four broad food groups--milk, meat, fruits and vegetables, and grain products, with certain specifications under each--this guide provides for flexibility in food choices to suit different preferences and supplies at different costs. Because of its adaptability and sound nutritional basis, the guide is widely used in educational programs directly, as a popular leaflet, or it is reproduced in text books and other materials.

### Education of Public Health Nutritionists

The Public Health Service provides graduate training grants in nutrition and public health for qualified applicants. During 1958-1960, 43 nutritionists received training preparing them to work as public health nutritionists in health agencies.

The Children's Bureau, through "special project" grants to States, provides for graduate training of professional health workers preparing them to serve in maternal, child health, and crippled children's programs. During 1958-1960, 22 qualified candidates were trained for public health nutrition for such programs.

In addition, Federal financial and personnel support has been provided for in-service training through institutes and workshops for nutritionists on

such topics as cardiovascular and other chronic diseases, food service consultation, growth and development, maternal nutrition, and mental retardation.

### Nutrition Problems Still Outstanding

Some of the main problems still outstanding in nutrition programs include a need for more knowledge about the nutritional requirements of all age groups, the biological value of foods, and the factors affecting food quality. The relationship of nutrition to health at all stages of the life cycle among all population groups, as well as to chronic disease, aging, congenital malformations, and prematurity, needs more investigating. Other problems include: the identification and prevention of obesity; more effective techniques to motivate individuals to establish better food habits; more effective methods of providing nutrition education for all groups in the population; and better methods to evaluate the effectiveness of present food and nutrition programs.

## HOME ECONOMICS

### New Directions in the USA

Home economics is primarily concerned "with strengthening family life through educating the individual for family living, improving the services and goods used by families, conducting research to discover the changing needs of individuals and families and the means of satisfying these needs, (and) furthering community, national, and world conditions favorable to family living." So said the Committee on Philosophy and Objectives of the American Home Economics Association, on the occasion of the 50th anniversary in June 1959, in a statement on "Home Economics, New Directions." Home economists serve as teachers and extension workers. They occupy professional positions in research, social welfare, and public health agencies, businesses, institutions, and international services. Many are full-time homemakers rendering valuable volunteer services to their communities. All are concerned with one or more of the following aspects of family living: family relationships and child development; consumption, economic problems of families, and the management of family resources; foods and nutrition; textiles and clothing; housing and household equipment and furnishings; or art as an integral part of everyday life.

These home economists number about 70,000 and about 27,000 belong to the American Home Economics Association. Most of them are women; a few men are in college teaching, research, or institutional administration.

### Home Economics Research

Both State and Federal agencies conduct research in consumer-related problems of textiles and clothing, housing and household equipment and consumption, family economics, and the management of resources. At the Federal level most of this research is carried out by the Institute of Home Economics, a unit of the Agricultural Research Service of the U.S. Department of Agriculture; at the State level, by the Agricultural Experiment Stations.

Research in textiles and clothing is conducted to determine clothing needs and the adequacy of available products in meeting these needs; to



obtain data basic to predicting the suitability of fabrics for various uses; and to develop guides for consumers in selection, construction, and care of clothing and household textile articles. A recently completed study was directed to the clothing problems of homemakers who, because of physical limitations requiring such aids as braces, crutches, or wheel chairs, find available clothing a deterrent to working efficiency, safety, and self-care. Research related to fabric serviceability has, in recent years, included studies of the cause and prevention of shrinkage and stretching of knit garments during laundering, a frequent reason for dissatisfaction among consumers. Continuing research on chemicals, methods for home laundering, and disinfection of fabrics has culminated in release during the past several years of a number of technical articles. They discuss the effectiveness of various kinds of detergents, bleaches, fluorescent whiteners, and disinfectants used at different concentrations and temperatures on fabrics of different fiber types and constructions. Booklets have been published to guide consumers in the selection and use of detergents, in methods of preventing mildew, and in directions for removing stains from modern fabrics.

To solve problems related to rural housing, research is undertaken on planning of functionally designed, well constructed, and economical farm housing, and to the selection, care, maintenance, and use of the house and its equipment. Research on rural housing requirements and design has involved cooperative regional and interregional studies of space requirements for household activity and storage areas and efficient arrangements of equipment and furnishings. Supplementing the research on space requirements are laboratory investigations of the physiological energy cost of performing household activities. Three energy-saving kitchen designs have been developed incorporating the findings on space requirements and energy expenditures. Findings also are presented in the form of graphic standards for use by architects and designers. A continuing activity of housing specialists, agricultural engineers, and architects in the research and extension services of the USDA in cooperation with State Land Grant colleges and universities involves development of house plans that incorporate results of research. Studies of household equipment have included determination of operating characteristics of, and performance requirements for, home laundering equipment, refrigerators and freezers, electric range ovens, and small electric appliances for food preparation. Available information is applied, upon request from government agencies, to the development of specifications for performance testing and purchase of household equipment.

Research is also conducted in the USDA and the Agricultural Experiment Stations on the level of living of rural families and on the home management and economic problems of families. This information is used by extension workers, teachers, and others who work with families in planning for better living. A number of surveys have been made in recent years to provide information on the levels of living of families residing in low-income rural areas. Studies determined the total money value of consumption of home-produced food, fuel, and clothing, the value of housing occupied, goods procured in previous years that still provide service, and expenditures for goods and services used up during the current year.

Other recent studies have measured the proportion of a wife's gross earnings available for family use after payment of job-related expenditures

and changes in home management practices made as a result of employment away from home. Still other problems that have been the subject of studies are family financial security, replacement rates of household durable goods, credit practices of rural families, preparation of guidance material on family financial management, and the development of budgets.

### Home Economics in School Programs

Home economics courses are taught in 96 percent of the 24,000 public secondary schools in the U. S. Approximately 49 percent of all girls in these schools, or an estimated 2,353,000, were enrolled in home economics courses in the spring of 1959. The 8th grade has the highest proportion taking home economics--73 percent. This proportion decreases to 60 percent in the 9th grade, 40 percent in the 10th, and to 28 percent in the 11th. However, it increases to 34 percent in the 12th grade. Only a few boys take home economics in high school. In 1959, slightly more than one percent of all the boys attending public secondary schools, or an estimated 63,000, were enrolled in home economics; the largest proportion was in the 12th grade.

In some secondary schools, home economics courses are offered as an elective subject in which pupils have the privilege of deciding for themselves whether or not they wish to enroll. However, home economics is a required subject in many of the public schools, with the proportion of courses which the schools require decreasing as the grade level increases. The home economics program for girls and boys includes the study of child development, clothing and textiles, family relations, food and nutrition, health and home care of the sick, home furnishings, and home management. With the steady increase in the number of homemakers employed away from home, home economics teachers have an opportunity to help develop skills and understandings needed by junior and senior high-school youth to assume such responsibilities as care of young children, family marketing, and preparation of meals.

Approximately 25,250 teachers conduct home economics classes in public secondary schools. Most of them--82 percent--teach only home economics. The others usually teach another subject. The number of home economics teachers per school varies from one part-time teacher to a number of full-time teachers, depending upon the home economics enrollment of the school.

Many schools also provide instruction in home economics for adults. Some communities offer special courses to assist working wives with various home management problems. Other communities offer courses for young married couples and out-of-school potential homemakers. Sometimes courses are taught by the same teachers who conduct high school classes, and sometimes by special teachers for adults. The content of the courses is planned in relation to the concerns, experiences, and problems of the families and individuals enrolled, and is continually being adjusted to meet social change.

### Home Economics in Colleges and Universities

Home economics has been a part of the university program in the United States for about 75 years. More than 400 universities and colleges offer home economics curriculums leading to degrees. During the 1958-59 school year

these institutions granted in home economics approximately 8,300 bachelor's degrees, 875 master's degrees, and 45 doctor's degrees. Total degrees awarded in home economics increased 7 percent--to 9,200 in 1958-59 from about 8,600 in 1950-51 compared to an increase of 1.6 percent for total number of earned degrees in all fields of study. During the same period, master's degrees in home economics increased 28.6 percent and doctor's increased 70 percent, while, for all fields of study, master's degrees increased only 6.7 and doctor's 27.6 percent.

The majority of students enrolled in college home economics courses are women. In the fall of 1959, there were more than 45,000 women and nearly 600 men enrolled as majors in home economics and approximately 28,000 women and 6,000 men from other departments in the colleges taking home economics courses. Some of these students enroll to get help with personal and family living problems; some for professional preparation. For example, nurses and prospective elementary school, health, and physical education teachers study nutrition. And students preparing to go into the retailing business register for textiles, costume design, home furnishing, or food classes. Sometimes institutions offer special courses for these students from other departments, and sometimes the regular home economics courses are open to them.

### Home Economics Extension

The home economics program of the Extension Service reached more than 8-1/2 million families during 1960. In the past few years, family and consumer economics, nutrition, management of family resources, human relations, and child development have been increasingly emphasized, rather than skills of production.

In addition to the usual methods of conferences, workshops, forums, tours, home visits, and mass media, printed materials on these subjects are sometimes distributed in supermarkets, libraries, factories, and laundermats, and courses are offered to the public.

One program no longer meets the needs of all families. There are special schools for young homemakers, classes for women who work away from home, and television programs for women confined to the home with young children, and classes for the handicapped and elderly.





# Farm Production

## LEVEL OF FARM OUTPUT

Output of farm products continued to rise in 1958-60. Production increased dramatically in 1958, but the rate of increase slowed in 1959 and 1960.

### Crops

Crop production in 1958 increased 11 percent from 1957 to 118 percent of the 1947-49 average, and has increased only a little since then. Generally favorable weather, particularly in 1958, materially aided crop production, and yields per harvested acre were far above those of earlier years, reaching a record high of 143 percent of 1947-49 in both 1958 and 1960. The acreages in which these record harvests have been produced were well below average. The total acreage on which 59 important crops were planted or grown averaged 331 million acres, the lowest for any 3-year period since 1915-17.

Production of food grains was a record high in 1958, when the wheat crop hit 1,457 million bushels. The 1959 wheat crop was a more normal 1,121 million bushels, in spite of an increase in planted acreage, because yields were cut by less favorable weather and a higher incidence of disease. Ample late spring moisture and favorable temperatures improved yields in 1960 and raised production to 1,350 million bushels. Rice production trended upward during this 3-year period with the greatest increase coming in 1959 as a result of an acreage increase following lapse of the "acreage reserve," a program designed to reduce production of the six "basic" commodities. Production in 1960 was 54.6 million cwt., slightly above 1959. Rye production during 1958-60 was well above average.

Feed grain production was up sharply in 1958-60 from earlier years, reaching a record high in 1959, 40 percent above 1947-49. An upward trend in corn production was primarily responsible. Corn crops set a new record each year, beginning with the 1958 crop of 3,725 million bushels, and ending with the 1960 crop of 4,304 million bushels. Uniformly good weather and continued improvements in cultural practices resulted in average corn yields exceeding 50 bushels per acre for the first time in 1958. Average yields went up again in 1960 to 53 bushels per acre. Harvested acreage of corn in 1959 was up nearly 10 million acres from 1958, with the end of the "acreage reserve" contributing to the increase. Acreage harvested in 1960 totaled 81 million, 1.2 million less than in 1959. Production of oats during 1958-60 was somewhat below average. The 1958 crop at 1.4 billion bushels was the highest of the period. The 1960 crop of 1.2 billion bushels was slightly above the 1959 crop. Crops of barley and grain sorghums were well above average in 1958-60. Yields of grain sorghum rose from 35.2 bushels per acre in 1958 (a record at the time) to 41.3 bushels in 1960 with the introduction of new hybrid varieties playing a significant role in the increase. Production of grain sorghum averaged nearly 600 million bushels during the period

and barley production averaged 440 million bushels. Hay production was well above average during the period.

Production of oilseeds (except cottonseed) reached a peak in 1958, 80 percent above 1947-49. Favorable weather that year raised yields of soybeans, peanuts, and flaxseed to record or near-record levels. Production of 1958-crop soybeans was a record 580 million bushels. Output of oilseeds dropped rather sharply in 1959 as acreage and yields declined, but production picked up in 1960. The 1960 soybean crop totaled 559 million bushels, the peanut crop 1.8 billion pounds, and the flaxseed crop 30 million bushels.

Although cotton yields were a record 466 pounds per acre in 1958, the acreage planted was far below average because farmers put 5 million acres of their 1958 allotments in the acreage reserve. Harvested acreage was the lowest since 1876, and production of 11.5 million bales was 2.5 million bales below average. With increased acreage permitted under the new program, and with yields holding up well, production increased sharply in 1959 and the crop totaled 14.6 million bales. The 1960 crop was 14.3 million bales. Production of cottonseed fluctuated in line with production of cotton lint. The 1960 cottonseed crop was 5.9 million tons.

Tobacco production was below average during 1958-60. Although yields were pushed to record levels, acreage allotments were cut rather sharply. Production in 1958, 1959, and 1960 was 1.7 billion, 1.8 billion, and 2.0 billion pounds respectively.

Increased sugar marketing quotas for domestic areas under the Sugar Act permitted an expansion of continental sugar crop production in 1958-60. Production of sugar beets was a record 17 million tons in 1959. Production of sugar cane was above average in both 1959 and 1960.

Potato and dry bean production was above average during 1958-60. Yields of both crops were at or near record levels.

Production of the major vegetables for both processing and fresh market declined from 18.2 million tons in 1958 to 15.9 million in 1960. Production of the important fruits also fell slightly to total 16.9 million tons in 1960.

## Livestock

The year 1958 marked the end of one cycle in cattle numbers and the beginning of another. All cattle on farms January 1, 1958, numbered 91.2 million head, including 21.3 million milk cows. Since then, the size of the beef herd expanded, and at the end of 1960, cattle numbers totaled 97.1 million, including 19.3 million milk cows. Marketings of cattle and calves also showed a rising trend during the period. Sales totaled 35.9 billion pounds in 1960 compared to 32.8 billion in 1958. Production of beef reached a record 14.7 billion pounds, carcass weight, in 1960. Production of veal at 1.1 billion pounds was below average.

Production of hogs was relatively large in 1958 and 1959, but fell off in 1960. Marketings of hogs in 1959 at 19.7 billion pounds were third highest of record, and pork production during the period was a post-war high, averaging 11.4 million pounds.

Production of lamb and mutton rose from 688 million pounds in 1958 to 768 million in 1960.

After declining slowly in 1958 and 1959, milk production rose a little in 1960 to total 122.9 billion pounds. The number of milk cows continued a long-time downtrend, reflecting the continued exodus of farmers out of dairying. However, the rate of decline in milk cow numbers slowed, and output per cow increased.

Poultry meat production increased in each year from 1958 through 1960. Record output was recorded for broiler production throughout the period, and for turkey production in all years except 1958. In 1960, broilers raised numbered 1.8 billion and turkeys, 85 million.

Egg production in 1958-60 ranged between 170 and 176 million cases of 30 dozen each, with the higher figure, a U. S. record high, occurring in 1959. The upward trend in the rate of lay continued during the period. The average number of layers on hand on U. S. farms during 1960 was 294 million, and their average production of 209 eggs each was 37 percent higher than 15 years earlier.

### Productivity

The upward trends in crop production per acre, livestock production per breeding unit, and output per man-hour continued in 1958-60. Table 1 indicates the trend in these measures of productivity.

Table 1. Trends indicated by certain measures of productivity

Item	1958 <sup>1</sup>	1959	1960
	Index numbers: 1947-49 = 100		
Crop production per acre	126	123	129
Livestock production per breeding unit	124	128	130
Farm output per manhour	188	195	208

<sup>1</sup> Not yet adjusted for census changes.

### Number of Farms

The number of farms continues to decline and the size of farms to increase. Preliminary reports from the 1959 agricultural census indicate a decline in the number of "census" farms to 3.7 million in 1959 from 4.8 million in 1954 (232,000 farms were dropped in 1959 because of a change in definition of a "farm"). The average size farm in 1959 was 302 acres, compared to 242 acres in 1954. (These figures have not been corrected for the change in definition.)



## DEMAND FOR FARM PRODUCTS

### Domestic Demand

An upward trend in business activity throughout most of 1958-60, coupled with an expanding population, supported a strong domestic demand for farm products. Disposable income per person, adjusted for change in price-level, was \$1,877 in 1958. It rose to \$1,947 in 1960, a gain of almost 4 percent. The U. S. population in 1960 numbered almost 181 million, 6,6 million more than in 1958. Expenditures for food per person averaged a little more than 20 percent of disposable income during 1958-60.

With this strong demand situation, domestic use of farm commodities reached an all-time high during the period 1958-60, averaging around 15 percent higher than in 1947-49. Total food use by civilians rose about a fifth in the 10-year period but net domestic nonfood use was around 3 percent lower. The population rise of a fifth from 1947-49, however, left per person food use of farm commodities little changed over more than a decade but per person nonfood use declined about 20 percent.

Nonfood uses of fats and oils per person were down more than a fifth from 1947-49. The use of cotton per person in 1958-60 averaged around 20 percent less than in the earlier period and wool consumption was only about half as large.

Red meat consumption per person rose 10 pounds from 1958 to 1960 to the second highest consumption level since the end of World War II, reflecting the record high level of consumer income prevailing during this period. Poultry meat consumption per person remained stable from 1958 to 1960, but at a level substantially higher than in any earlier period. Per person use of eggs and the milk equivalent of all dairy products (including butter) declined each year from 1958 to 1960. The level of egg consumption per person in 1960 was 10 percent below 1947-49 and milk consumption per person was down about 12 percent, both reductions seemingly reflecting a basic change in consumer preferences. Per person use of most other food commodities showed little change during 1958-60. (See section on Food Consumption and Nutrition for more details.)

### Exports

A high level of agricultural exports during 1958-60 complemented the strong domestic use of agricultural products. In the fiscal years 1958-60, agricultural exports averaged \$41.1 billion compared with \$3.6 billion in the 1947-49 period. However, with a declining level of export prices the volume of farm product exports increased almost 50 percent.

In recent years, the value of agricultural exports has averaged about 13 percent of cash receipts from farm marketings, but total exports have represented only 4 percent of the gross national product.

The volume of U. S. agricultural exports reached an all-time high in fiscal 1960, slightly above the previous record of 1957. Export value totaled \$4.5 billion, second highest on record. More than half of the increase from

fiscal 1959 was in cotton. Shipments of cotton nearly doubled and were the second largest in 26 years. Shipments of wheat and rice were next to the largest on record. Exports of vegetable oils, soybeans, feed grains, poultry meat, variety meats, tallow, and dried beans all reached new highs.

Of the \$4.5 billion worth of U.S. agricultural exports in fiscal 1960, \$3.2 billion were commercial sales for dollars, and \$1.3 billion moved under Public Law 480 and the Mutual Security Act. (See Foreign Agricultural Program section for more details.)

### Buildup of Stocks

Although total domestic use and exports of agricultural products were at record highs in 1958-60, the tremendous gains in agricultural production contributed to a continuing stock build up, particularly of wheat and corn. Most of the carryover stocks of three commodities, wheat, corn, and cotton were acquired by the Commodity Credit Corporation under the price support program. Total wheat stocks were 1.4 billion bushels at the beginning of 1958.

They rose to around 2.0 billion bushels by the end of 1960. Corn stocks increased from 3.6 billion bushels to 4.7 billion over this period. Cotton stocks increased from 1958 to mid-1960, but a substantial reduction took place in the latter part of the year because exports and mill consumption, raw cotton opened and processed by mills, exceeded production. Practically all of the wheat, nine-tenths of the corn, and two-thirds of the cotton carried over in 1960 were under loan or owned by the Commodity Credit Corporation.

The CCC's investment in commodity inventories and price-support loans outstanding rose from \$7.2 billion at the beginning of 1958 to \$9.2 billion at the end of 1960. The 1960 total included \$7.4 billion in price-support inventories and \$1.8 billion pledged for loans. This investment in price-support commodities represents 74 percent of the Corporation's borrowings of \$12.4 billion presently in use. The balance of borrowings was used primarily for financing commodity disposal program costs recoverable through appropriations authorized by specific statutes (P.L. 480 Titles I and II, P.L. 540 Title II, Sec. 206, International Wheat Agreement, National Wool Act of 1954, etc.) and losses on the disposition of commodities not yet restored by Congress.

## FARM PRICES AND COSTS

### Farm Prices

Farm product prices in 1958-60 ranged between 88 and 93 percent of the 1947-49 average. Prices received by farmers in the past three years averaged somewhat above the post Korean low levels. During the Korean conflict, farmers' prices and net income reached peaks but afterwards trended downward. Realized net farm income in 1958-60 averaged \$11.8 billion.

Prices received by farmers in 1958 averaged over 6 percent above 1957, substantially due to higher prices for cattle and hogs. However, with a large crop harvest and increased marketings of hogs, prices of farm products declined in the fall of 1958 and into 1959. Farm product prices in 1959 averaged 4 percent below 1958. Most of the drop was in hogs, eggs, and broilers.

In 1960, prices received by farmers were about the same as in 1959. Although prices in the first quarter of 1960 averaged more than 3 percent below the first quarter of 1959, prices strengthened in the remainder of the year. Improved prices for hogs, eggs, and dairy products were the main source of increase. Cattle prices in 1960 averaged somewhat below 1959 levels and prices for most crops averaged the same as in 1959.

Prices paid by farmers, interest, taxes and farm wage rates have trended upward steadily since the end of World War II, and in 1958-60 averaged almost a fifth higher than in 1947-49. The largest increase was for interest payable per acre on farm real estate debt, with farm real estate taxes payable per acre also up sharply. Prices for production items rose more than 11 percent over this period and those for family living items averaged 18 percent higher than in the earlier period. The upward price movement in prices paid by farmers for commodities and services tapered in 1958-60 as inflationary pressures in the economy eased. As a result of rising cost rates, the parity ratio averaged 82 in 1958-60, contrasted with a ratio of 108 in 1947-49. Parity measures the extent to which prices farmers receive for farm products are, on the average, higher or lower in relation to the prices they pay for goods and services than they were in the base period 1910-14.

### Farm Income

When the prices farmers receive for their products go down, while at the same time the prices that they pay for things stay at high levels, then the farmer is said to be in a "price-cost squeeze." During this period 1958-60, prices received by farmers for all farm products dropped 5 percent, while prices they paid for all items, interest, taxes, and wage rates rose about 2 percent.

While rising farm marketings boosted gross farm income to a record level in 1958-60, the steady increase in production expenses held net farm income below the levels of 10 years earlier. Realized net income was between \$11 and \$12 billion each year from 1955 to 1960, except for 1958 when a sharp increase in farm production and a rise in prices boosted it to \$12.6 billion.

In 1960 farmers' realized net income totaled \$11.7 billion. Cash receipts from marketing farm products, \$34.0 billion, and production expenses, \$26.4 billion, were both record high. Nonmoney income and Government payments totaled \$4.1 billion. Nonmoney income includes farm products consumed directly in farm households (valued at average prices received by farmers) and the gross value of housing provided by farm dwellings. Government payments to farmers are those made directly to farmers in connection with farm programs such as Agricultural Conservation and Wool Incentive Programs. In 1960, Government payments to farmers totaled around \$693 million, about the same as a year earlier.

### Farm Assets

The value of farm assets continued to rise in 1958-60, but at a slower rate than in preceding years, averaging almost 60 percent higher than in



1947-49. The growth in farm assets principally reflected the rise in farmland values and large investment in machinery and equipment. Farm debts also climbed steadily, but are still relatively low compared with total assets.

## RESEARCH AND EDUCATIONAL ADVANCES

### Research in Physical and Biological Sciences

A noteworthy trend in agricultural research during 1958-60 has been the increase in the application of research results by private industry from USDA and State agricultural experiment station laboratories. Some of these uses are listed below. Another trend is an increased emphasis in USDA on basic investigations as opposed to applied research and development. Basic research now comprises about 25 percent of the research effort of the USDA, with a goal of 50 percent in the next few years.

### Utilization of Farm Products

In the field of farm-product utilization, one outstanding achievement during the period is the development of dialdehyde starches. This breakthrough in starch chemistry is regarded as a major advance in chemurgy. Industry is using these modified starches in the tanning of leather and the production of paper products with greater wet strength.

A new hybrid corn produces 80 percent amylose starch--a special kind of starch valuable for use in adhesives, films, and paper additives. A water-soluble zein, a chemically modified corn protein, has proved useful in the manufacture of printing inks. A new product, developed by fermentation of starch and known as phosphomannan, is useful as an adhesive and industrial thickener. Epoxidized oils from animal fats are used in plastics. A new compound called vinyl stearate makes vinyl plastics more flexible. Urethane foams from castor oil give better water and shrink resistance to fabrics. Wash-and-wear cotton and wool fabrics have been improved. Chemical additives are used to preserve vitamins A and E in dehydrated alfalfa. Dehydrated mashed potato flakes and improved granules and other processed potato products have been developed.

### Animal Husbandry

In animal husbandry research, a system has been developed for a single, completely uniform dairy herd improvement production record for all dairy cattle breed registry organizations. Research with dairy cows has indicated that measurement of body temperature may be a useful means to detect variations in corpus-luteum activity, as well as the presence or absence of ovulation. Nonfat milk constituents have been shown to be heritable, partially independent of fat constituents, giving promise that selective breeding can develop strains of cows yielding milk with a more desirable composition.

Greatly extended breeding seasons in turkeys have resulted from increasing the length of the light day from 12 to 15 hours over an 18-week period. Effective breeding seasons of about 24 weeks have resulted, compared with the usual maximum of 16 weeks or less.

Researchers learned that a specific part of the hypothalamus of the chicken brain controls release of the hormone or hormones responsible for ovulation.

An x-ray technique for screening potential breeding animals for characteristic abnormalities that result in bovine dwarfism has proved to be about 90 percent successful.

Results to date strongly indicate that selection based on back-fat thickness in swine offers an excellent opportunity to modify the lean-to-fat ratio of hog carcasses.

### **Animal Disease and Parasite**

In animal disease and parasite research, foot-and-mouth disease virus has been found to persist for periods as long as 50 days in lymph glands and 60 days in bone marrow in carcasses and meat from infected animals handled in accordance with standard meat processing procedures.

Progress is being made toward diagnostic differentiation of hog cholera from African swine fever.

Proper barn storage of hay for 3 weeks has provided a simple method of controlling of the beef tapeworm. Egg cells of the parasite desiccate during the dry storage period.

Important work at the East Lansing, Mich., poultry laboratory has showed that erythroblastosis, an infectious leukemia-like cancer of the bone, marrow, and blood, can be transmitted to offspring by direct contact. Allied studies indicated that resistance to erythroblastosis is partly genetic.

An inactivated virus vaccine for Newcastle disease has been developed.

### **Crops**

In crops research, a significant advance has been made in understanding plant responses to light. A pigment that controls the response of plants to light was isolated and partially purified. This finding is one of the most important discoveries in plant physiology since the role of auxin was discovered in the early '30's.

Other examples of research findings include: the development of the Cody variety of alfalfa with resistance to the spotted alfalfa aphid; six new soybean varieties with resistance to diseases in the North Central and Southern States; a new high-yielding safflower variety named Gila; a new lupine named Blanco for winter grazing use in the lower South; and new and practical methods for controlling stemrot diseases of peanuts.

Two varieties, Texsel and Groehler, of a new U.S. crop, guar, have been developed from selections from a single introduction of seed from India in 1936. The vegetable gum mannogalactan, milled from guar seed, is used in paper and textile industries for waterproofing dynamite, for preparation of oil drillers mud, concentration of ore in the flotation process, and preparation of cheese spreads, frozen desserts, and cosmetics.

In entomology research, more emphasis has been placed on the use of biological control, systemic insecticides, insect sterility, attractants, and other new approaches to insect control. This emphasis represents an effort to find more effective methods for controlling injurious insects, and at the same time, to reduce the hazards involved in the use of chemical insecticides, including residues on foods and feed crops that might be harmful to man or animals.

Progress has been reported in the control of tobacco hornworms with the use of sprays containing spores of a bacterium known as Bacillus thuringiensis. Two new systemic insecticides are effecting 90-100 percent control of cattle grubs. An improved powder has been perfected for control of human lice vectors of typhus. A virus disease of the citrus red mite has been under study as a possible natural control. Two new synthetic lures, more attractive to the melon fly and the Mediterranean fruit fly than any previously known, were developed. Seven varieties of wheat resistant to the Hessian fly and one variety of alfalfa resistant to the spotted alfalfa aphid were released to growers as a result of cooperative research by entomologists and plant breeders. Chemists synthesized the natural sex attractant of the gypsy moth and a closely related chemical attractant that can be easily produced. Chemosterilants - chemicals that produce sterility - have shown promise as a new approach to insect control.

### Future Trends in Agricultural Research

In the physical sciences research will be concerned with basic problems concerning the quality and nutritive values of food and the quality and use of fiber. Continued emphasis will be placed on new and better utilization and handling of agricultural products and by-products.

Agricultural engineers will be working to perfect machine-harvesting of fruits and vegetables to alleviate problems associated with the use of itinerant short-term labor. Research on the mechanization of handling of seed, fertilizer, feed, and other agricultural products and materials on the family-operated farm will seek to assist the farmer toward more efficient use of time and labor.

Chemurgy will continue to seek new and better use of agricultural materials. Special emphasis will be placed on agricultural commodities produced in excess of current national needs.

Increased attention will be placed on research aimed at better distribution and expanded use of farm commodities in the world market.

In crops research, the next few years will see about 50-60 percent of the investigations concerned with basic questions on the nature of disease resistance, including studies on genetic and physiological response to factors and vectors of disease, and host-pathogen relationships. There will be continued development, both basic and applied, concerning the response of plants to chemicals and substances affecting growth and development. The interactions between plant and chemical, such as have been reported by



herbicide investigators, indicate this to be a promising field for scientific advance.

There is to be increased work in developing specific qualities in plant varieties in response to needs imposed by the special requirements of food processors and in general by mechanized handling of commodities.

In animal disease and parasite research, the new animal disease center at Ames, Iowa, will provide better facilities for the study of domestic diseases. Parasitology investigations will emphasize possibilities of biological control. At Plum Island, N. Y., work will continue on exotic diseases, particularly foot and mouth disease.

Animal husbandry research will be concerned with the feeding and nutrition of livestock, with special attention to ruminant metabolism. Priority will also be given to the field of genetics, with special reference to the heritability of feed efficiency. Attention will also be given to the role of hormones and other substances affecting production and meat quality.

Entomological research will be directed toward developing measures to aid growers of agricultural crops and producers of livestock to control insect pests without creating insecticide residue problems. More basic knowledge is needed on the physiology of insects and the nature of insect resistance to insecticides. Biological control in its various forms and a number of promising new approaches, such as insect sterility induced by radiation and certain chemicals, and sexual chemical attractants for insects, will be major parts of the research program.

### Trends in Farm Economics

The revolution in farming methods in the United States continues. Economic studies show that U. S. agriculture will undergo further major changes in the 1960's. Productive capacity in the decade ahead is more than sufficient to meet prospective market demands at home and abroad. Consequently, the per capita income position of farmers relative to other groups in the economy will decline further unless production is adjusted to anticipated demand with the assistance of government programs.

Marked changes in the structure of agriculture occurred in the last decade and additional changes are in prospect over the next 10 years. Numbers of farms and of farm workers are decreasing rapidly. Nonfarm inputs, such as fertilizer, pesticides, and machinery, are becoming increasingly important in farm production. In many communities, the physical, social, and economic boundaries between farm and city are being erased.

Technology has enabled farm families to operate larger and larger units. As a consequence, the number of farms heretofore considered too large for a farm family to operate has been brought within the size limit of the family farm; the trend is to fewer but larger family farms.

Increasing investments required by technology have increased the size of farm required to provide the farm family an acceptable level of living. Thus numerous farms previously producing an acceptable level of income no longer are capable of doing so.

Numbers of farms too large for the farm family to handle with a hired labor force no larger than that of the farm family decreased about a third in the last decade. As most of the economies of scale are achievable within the size limit of the family farm, this trend is expected to continue. Conversely, the decline in the number of farms too small to provide a farm family an acceptable level of living also is expected to continue. Family farms will tend to increase as a percentage of all farms, but they will become increasingly susceptible to a price-cost squeeze because of increasing capital requirements and increasing reliance on purchased inputs.

### Educational Programs for Farmers

A major phase of the educational program of the Cooperative Extension Service is directed to the improvement of farm production. During the past three years, nearly 4 million farm families were assisted annually with some phase of farming efficiency. The total program of the Extension Service includes work in the following areas: production, marketing, resource conservation, management, youth development, family living, community improvement, and public affairs with emphasis on the application of new technology, farm management, marketing, and farm business adjustment.

### EFFICIENCY OF FARM PRODUCTION

Wider use of production records for selecting breeding animals has resulted in improvement in herd efficiency and quality. Extension provided leadership in organizing centralized electronic centers for processing dairy and beef cattle production records from 40 States. Over 3500 beef cattle producers are cooperating with extension on-the-farm programs for testing weight for age and selection for conformation. Educational emphasis is on teaching producers to interpret and use herd records.

Extension provided leadership in educational programs to eradicate many animal diseases and parasites using methods developed by science. Producers were organized to cooperate with regulatory officials in nationwide eradication programs. Screw worms were eradicated from the southeastern States and vesicular exanthema of swine from the entire United States. Half the States attained modified certified status in the national brucellosis eradication program and the others are on the way.

The safe, effective use of chemicals in agriculture is receiving new emphasis in extension work. From a half dozen basic chemicals used as pesticides in 1940 the number mushroomed by 1957 to over 100 used in thousands of mixtures. Wherever these materials have application to agriculture, the extension worker bears responsibility for teaching safe, economical and proper use to farmers.

### Farm Management

Increasing emphasis has been given by the Extension Service to teaching of management and decision-making principles to help farmers solve current management problems of increasing complexity.

A number of farm management schools were held in the States. Farmers

devoted time to analyzing economic and other consequences of alternatives to major farm management problems. This was followed by individual counseling on farmers' specific problems.

### Agricultural Resource Adjustment

During the past three years the Extension Service gave serious consideration to the need for agricultural resource adjustment. Seminars were conducted on land use, credit, and human resources. Resource material was compiled and widely used throughout the Cooperative Extension Service.

In addition, the Center for Agricultural and Economic Adjustment at Iowa State University was organized with a substantial grant from the Kellogg Foundation to stimulate this work. Adjustment workshops were held in each U. S. extension region attended by Land Grant college administrators, economists and sociologists.

The Federal Extension Service cooperated with the Department of Labor in establishing four State pilot programs to develop economic and human resources to facilitate desirable adjustments from agriculture to the non-agricultural sector. The program involved the State industrial development commissions, State boards of education, and other groups that contribute to an area's economic growth and to desirable adjustments.

### Agricultural Outlook

Agricultural outlook work in the U. S. A. was initiated almost 40 years ago with the objective of helping to gear production to market demand. Cooperative regional work was started in 1959. Over the past 2 years, the Extension Service, in cooperation with the Agricultural Marketing Service, has conducted a livestock marketing information and outlook project for the Western States with headquarters in Denver, Colo. The purpose is to provide the western livestock industry with marketing information on a regional basis that will be helpful to all segments of the industry in making management decisions. The short and long outlook for western livestock and livestock products from the Great Plains westward is disseminated in monthly reports distributed to producers, extension services, and other interested groups and individuals.

## AGRICULTURAL ADJUSTMENTS

During the period 1958-60, the total acreage harvested annually varied within a range of only 1 percent but this did not indicate lack of resource adjustments in the aggregate, between crops or by individual farmers. With continuing mechanization, farmers have been enlarging their farms and farming operations, thereby usually increasing the efficiency of fixed capital inputs. Greater specialization also has contributed to higher productivity. Total farm output in 1958 was 25 percent, and in 1960, 29 percent, above the 1947-49 average.

High production combined with large stocks of some commodities required continuing attention to supply adjustment during 1958-60. Adjustment



programs included acreage allotments and marketing quotas, marketing agreements and orders, and the Soil Bank.

The Agricultural Act of 1949 provided that, as a condition of eligibility for price-support, producers could be required to comply with acreage allotments and marketing quotas. This provision has been used in recent years in an attempt to limit the stimulus given by price support to higher production. Marketing quotas could be used only for the basic commodities, except corn; that is, for cotton, peanuts, rice, tobacco, and wheat. Acreage allotments could be used for any price-supported commodity.

### Acreage Allotments and Marketing Quotas

Marketing quotas are determined basically as follows: the quantity of a given commodity that will provide adequate supplies is determined. This quantity--the national marketing quota--is translated into terms of acreage. The acreage is allotted among States, counties, and finally among individual farmers.

Acreage allotments and marketing quotas are designed to reduce quantities of given commodities marketed by farmers, and to help to reduce the supply whenever it becomes, or is likely to become excessive. When acreage allotments and marketing quotas are in effect, farmers who do not comply are denied price support and required to pay a penalty on marketings. Marketing quotas are not imposed unless approved by two-thirds of the farmers growing the specific crop voting in a referendum. If farmers disapprove quotas, price support is prohibited for tobacco, and available at sharply reduced levels for cotton, peanuts, rice, and wheat to producers who comply with acreage allotments.

Acreage allotments and marketing quotas were in effect for cotton, peanuts, rice, and wheat at the lowest permissible level, in each of the 3 years 1958-60. Acreage allotments were in effect for most types of tobacco for each of these years. For corn, allotments were in effect for 1958, but under the provisions of the Agricultural Act of 1958, they were not available for 1959 and 1960.

### Price Support Program

The price support program endeavors to bring about a better balance between production and utilization of agricultural commodities by assisting farmers in more orderly marketing of crops, and by assuring greater stability of prices and farm income. Under the program, the Government provides the farmer with an outlet for any quantity of a supported commodity which met eligibility requirements.

Price support is accomplished through loans, purchase agreements, purchases, and payments. Loans are most frequently used because they are adapted to storable commodities. For some commodities, purchase agreements, as well as loans, are sometimes used, when commodities are maintained in approved storage. This is an agreement on the part of the Government to purchase from the producer--at his option and at the support price--not more than a stipulated quantity of the commodity. Purchases are used to support dairy products, and direct payments were made for wool.

The basic elements of the program were unchanged during the three years, although significant modifications were made for a number of commodities.

The following commodities were supported each year during the 1958-60 period: corn, wheat, rice, cotton, peanuts, tobacco, milk and butterfat, wool, mohair, tung nuts, and honey. Support also was mandatory for the 1959 and 1960 crops of barley, oats, grain sorghums, and rye at a level determined to be reasonable in relation to the support level for corn.

Price support levels for the 1958 crops of basic commodities except tobacco (corn, wheat, rice, cotton, and peanuts) were determined within the range of 75-90 percent of parity on the basis of a sliding scale, which took account of the total supply in relation to a defined normal supply. For tobacco, support was mandatory at 90 percent of parity for types for which marketing quotas were in effect.

For corn, the Agricultural Act of 1958 provided for price support at 90 percent of the average prices received by farmers during the 3 preceding years, provided that the support level was not less than 65 percent of parity.

For rice, the 1958 Act provided for price support for the 1959 and 1960 crops at not less than 75 percent of parity; for the 1961 crop, at not less than 70 percent of parity; and for the 1962 and subsequent crops, at not less than 65 percent of parity--with the actual level determined without regard to the sliding scale.

For cotton, the Agricultural Act of 1958 provided each farmer a choice for the 1959 and the 1960 crop between (A) his regular allotment and marketing quota with the level of support determined as previously (except that for the 1959 crop support could not be less than 80 percent of parity) and, (B) an increase of 40 percent in his regular allotment and marketing quota with support at 15 percent of parity lower than the level established for farmers who elected Choice A. For 1961 and subsequent crops the 1958 Act provided for price support to be determined without regard to the sliding scale, and within the range of 65 to 90 percent of parity, except the minimum permitted for 1961 is 70 percent.

For tobacco, for which support has been inflexible at 90 percent of parity, legislation approved in February 1960 provided support of the 1960 crop at the same dollars and cents level at which the 1959 crop was supported. For 1961 and subsequent crops, the support level for tobacco, so long as producers do not disapprove marketing quotas, is to be determined by adjusting the ratio of (1) the average of the indexes of prices paid by farmers for the 3 preceding calendar years to (2) such index for the 1959 calendar year.

## The Soil Bank

The Soil Bank, introduced by the Agricultural Act of 1956, was designed to divert cropland from the production of excessive supplies of agricultural commodities, and to carry out a program of conservation. The original Soil Bank Program consisted of two parts: the acreage reserve, and the conservation reserve.

Under the acreage reserve, producers of wheat, corn, cotton, rice, and most types of tobacco were invited to enter into 1-year contracts with the Government by which they agreed not to plant all of their acreage allotment. In return, farmers received compensation payments. Land put in the acreage reserve could not be used for other crops or grazing. This program proved costly in relation to results, partly because farmers were able to give up their least productive land, and to concentrate resources on their most productive land. The program was discontinued after the 1958 crop.

The conservation reserve was aimed at withdrawing cropland from production for 3 to 10 years. All cropland was eligible for the conservation reserve and, as in the case of the acreage reserve, contracted land could not be cropped or grazed. Under the contract, the Government agreed to pay an annual rental for cropland placed in the conservation reserve. Where protective vegetative cover did not already exist the Government also was authorized to pay part of the cost of establishing cover to conserve the soil during the contract period--3 to 10 years. Authority to enter into contracts with farmers ended December 31, 1960. The Government is committed to honor all existing agreements, some extending through 1969.

During the 5-year period 1959-60, 28.7 million acres of cropland on 306,000 farms were placed in the conservation reserve. This represented about 6.2 percent of the total cropland reported in the 1954 Census of Agriculture. The average rental paid to farmers was \$11.85 per acre per year. The average Government cost of establishing conservation cover on this land in 1960 was \$5.68 per acre treated.

In addition to basic production adjustments obtained through Soil Bank, acreage allotment, and marketing quota programs, other land use adjustments were achieved through the Agricultural Conservation Program. This continuing program, discussed later, contributes to shifting of farmland from intensive production of surplus crops to conservation uses.

### Marketing Agreements and Orders

Marketing agreements and order programs established under the Agricultural Marketing Agreement Act of 1937, as amended, seek to establish and maintain orderly marketing conditions for certain agricultural commodities. Policies with respect to these programs were substantially the same in 1960 as in 1957.

Federal milk marketing orders provide for classification of milk on the basis of use, and for the establishment of minimum prices that must be paid producers for the milk going into various uses. Such orders were in effect during 1960 in 80 areas, in which about 58 percent of the nonfarm population of the U. S. resides. About 45 billion pounds of milk were delivered during the year by about 190,000 producers to handlers under terms of the orders.

In 1960, 42 marketing agreement and order programs were in effect for fruits and vegetables. Twenty of these were on fresh citrus and deciduous fruits, 6 were dried fruits and tree nuts, and 16 on vegetables and potatoes. For these commodities, the statute provides for several types of regulatory activity. Among the methods which may be used separately or in combination are



regulation of quality and containers, establishment of reserve pools, surplus control, price posting, prohibitions of unfair practices, and research and development. These regulations or activities, unlike those under milk order programs, do not establish prices that must be paid producers. They are, however, intended to enhance or maintain prices received by producers. The trend toward more marketing agreement and order programs for fruits and vegetables is illustrated by the increase in the farm value of products covered to a level of more than \$1 billion a year, and the addition of several new programs during 1958-60.

### **Vegetable Guides**

The acreage guide program for vegetables for fresh market and vegetables for processing, including potatoes and sweetpotatoes, is directed toward balancing the supply of each vegetable with the demand. On the basis of reports prepared by specialists and latest information available, specific recommendations were developed for each commodity. These were in the form of estimates of the acreage of particular vegetables required, with average yields, to meet anticipated market needs. The guides were announced each year, with a brief report explaining the reasons, in sufficient time to assist growers in planning production. Compliance by the growers was entirely voluntary; however, it has been the policy to limit surplus removal assistance to areas where there has been substantial compliance with acreage guides.

### **Federal Crop Insurance**

The programs outlined have been designed primarily to deal with the farmer's price risks. The crop insurance program of the Federal Crop Insurance Corporation is designed to help the farmer solve his production risks--principally weather risks. Despite national surpluses of a commodity, many individual farmers lose their crops and investment in production costs.

The Federal Crop Insurance Program, more than 20 years old, continued to help American farmers meet crop failure problems during the years 1958-60. The program is still experimental and in most counties confined to one or two of the major crops. Crops insured during the year 1958-60 included wheat, cotton, corn, tobacco, barley, oats, grain sorghums, flax, beans, soybeans, citrus fruit, peaches, and rice. Insurance on one or more of these crops was in effect in over 800 of about 3,000 U. S. counties. Wheat, the first crop insured (1939), has been the crop with the largest amount of insurance (in 480 counties in 1960). Premiums from wheat insurance are almost half of the total premiums. On the other hand peach insurance is still in the early experimental stage with insurance issued for several years in only one county. In addition to providing separate insurance on individual crops the Corporation offered combined insurance in 49 counties in 1960. The indemnity payable is determined on the basis of combined production from several crops. The premium cost is less expensive than individual insurance because of the diversification of risks the farmer obtains by growing different kinds of crops.

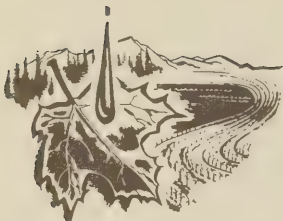
This insurance is essentially "all-risk" insurance, except for a small amount of insurance on fruits. It covers unavoidable losses due to adverse weather, insects, diseases, and some other minor causes. Avoidable losses from these causes are not covered. Drought has been the principal cause of loss.

During the years 1958-60, the annual volume of premiums each year was approximately \$18,000,000. The ratios of losses to premiums during each of the 3 years were respectively .26, .76, and .55. These 3 years had unusually good crops enabling some surplus funds to be built from the operations, a reserve to meet heavier losses during years of poorer crops. One of the crucial tests of a crop insurance system is the ability to build up reserves in years of good crops to help pay the much heavier losses when crops are poor. The Federal Crop Insurance Corporation also has a paid-in-capital of \$40 million serving as a reserve against heavy losses in years of poor crops. During the 13-year period 1948 to 1960 losses amounted to 94 percent of the premiums.

Crop insurance is voluntary, much of the time and expenses of the Corporation is devoted to selling insurance. The crop insurance policy may be used as collateral for a loan to produce the crop, or for some other agricultural credit advance, but the decision is up to the farmer and the creditor. Although such credit arrangements provide incentive for some crop insurance sales, most crop insurance is sold directly to the farmer against loss of investment in his crop, and to stabilize his income.

Annual averages for 1958-60 were:

Amount of insurance .....	\$258,534,000
Amount of premium.....	\$17,964,000
Premiums as a percent of amount of insurance (This might be considered an average of the premium rates on insurance in effect ) .....	6.9%
Number of losses paid.....	30,844
Amount of losses paid.....	\$9,158,000



## Developments in Soil and Water Conservation

Use of land in accordance with its capabilities, and treatment according to its needs for protection and improvement, have been objectives of the U. S. Department of Agriculture for many years. Cooperative activities to accelerate soil and water conservation on the privately owned lands of the United States continued during the 1958-60 period.

Federal funds are provided for several different conservation programs of the Department through which technical services, cost-sharing, conservation loans, and other forms of assistance are provided to land owners, operators, and community groups. Such work is a part of the national effort of protecting and improving natural resources, on both public and private lands.

Soil and water conservation work on private lands is conducted on a voluntary basis in cooperation with State and local organizations. Early emphasis was upon erosion control. More recently the action programs of the Department have been strengthened and broadened through new legislation. Among these are the Watershed Protection and Flood Prevention Act, the Great Plains Conservation Program, and increased authorizations for assistance to growing numbers of soil conservation districts.

### SOIL CONSERVATION SERVICE

The Soil Conservation Service (SCS) was established April 27, 1935. It assists soil conservation districts and other cooperators, watershed groups, and Federal and State Agencies having related responsibilities to bring about physical adjustments in land use that will conserve soil and water resources, provide for production on a sustained basis, and reduce damage by floods and sedimentation. The SCS has continued to provide technical leadership in such program responsibilities through the 1958-60 period. Some brief highlights of conservation programs for which annual appropriations are made to SCS are given in the following sections.

#### Soil Conservation Districts

All 50 States in the U. S. have passed enabling legislation which provides for the formation of locally managed soil conservation districts. By the end of 1960, 22 States were completely covered by such districts and many others were nearly covered. Conservation work was carried on in 2,849 soil conservation districts covering 1,670 million acres which include 95 percent of all farms and ranches in the 50 States. Eighteen districts in Puerto Rico and the Virgin Islands contained an additional 54,270 farms covering 1,856,000 acres.



The districts are organized for the purpose of planning, applying and maintaining conservation practices that will prevent soil erosion, improve soil fertility, conserve land and water resources, provide for watershed protection, and safeguard the productivity of land on a long-term basis. During the period 1958-60, farmers and ranchers organized 151 new districts and additions of new territory were made to many older districts.

More than 1,800,000 farmers and ranchers who own and operate 572, - 000,000 acres were cooperating with their local districts in 1960. Many of them had developed long-term conservation plans for their lands. This means that such cooperating landowners made their own decisions about future land use and treatment needs, including combinations of practices necessary for conservation, protection, and improvement.

Such practices include contour farming, conservation cropping systems, stripcropping, and covercropping on croplands; pasture planting, range seeding, and proper use of grazing lands; and tree planting, woodland improvement, and selective cutting of woodlands. Terraces, farm ponds, grassed waterways, farm drainage, irrigation, or structural work may also be a part of conservation plans. More than a hundred different soil and water conservation practices are applicable in various ways in different parts of the country.

During the three-year period 1958-60, about 283,000 farmers and ranchers were assisted by the Soil Conservation Service with the development of new conservation plans on 90 million acres. In addition, technical assistance was provided to about 1 million district cooperators each year to help them apply their planned practices to the land. This included review of plans, making revisions or changes where desired, detail designs, layout, or supervision of construction work when necessary to meet standards and specifications.

### Conservation Operations Program

The SCS provides technical and other assistance to soil conservation districts and other cooperators in the 50 states, Puerto Rico, and the Virgin Islands. Assistance includes: conducting soil surveys to determine land use capabilities and treatment needs; publishing soil survey reports and maps; helping farmers and ranchers develop and apply conservation plans; operation of plant material centers; and development of streamflow forecasts from snow surveys in the Western States.

During 1958-60, the Service prepared soil surveys on 139,284,000 acres of farmland and 41,392,000 acres of rangeland. Seventeen plant material centers were in operation and another center was being established to develop promising new species of plant materials. Streamflow forecasts from snow surveys were widely distributed and used to estimate availability of water for irrigation.

Technical services were furnished by SCS to participants in the Agricultural Conservation (cost-sharing) Program on permanent-type practices for which responsibility has been assigned to the SCS. About 460,000 farmers and ranchers were assisted annually with practice installation, as part of the ACP cost-sharing program. Some consultative services and technical assistance were also furnished by other Federal and State Agencies on a reimbursable basis.

## **Watershed Protection Program**

This program includes investigations and surveys of proposed small watershed projects and preparation of project work plans with local sponsoring organizations. It involves cooperation with States and other local public agencies in the installation of works of improvement designed to reduce erosion, floodwater, and sediment damage, and further the conservation, development, utilization, and disposal of water. This requires cooperation between several Federal, State, and local public agencies in making investigations and surveys of the watersheds of rivers and other waterways for the development of coordinated water resources programs.

The Soil Conservation Service has general responsibility for administration of this program, as well as for the formulation and development of its guiding principles and procedures. Loans to local organizations to finance their share of the costs of carrying out works of improvement are made through the facilities of the Farmers Home Administration.

Sixty-two "pilot" projects were started in 1954 in cooperation with local sponsors. They have served as demonstrations of the effectiveness of complete watershed treatment in preventing erosion and reducing floodwater and sediment damages. As of June 30, 1960, the planned works of improvement had been completed in 33 of these projects.

## **Flood Prevention Program**

The Soil Conservation Service has general responsibility for administration of the Flood Prevention Program, including formulation of guiding principles and procedures. The program is conducted in 11 authorized watersheds comprising nearly 31 million acres. It includes the planning and installation of watershed improvement measures for flood prevention and the making of loans (by FHA) to local organizations to finance their share of the cost of carrying out planned works of improvement.

Some of the main practices installed on the land in all the 11 watersheds as of June 30, 1960, were as follows: 956 floodwater retarding structures, comprising nearly 600,000 acre feet of temporary storage; 850 grade stabilization and sediment control structures; 1,126 miles of channel improvement; and extensive land treatment measures on the watershed lands, particularly above structural sites.

## **Great Plains Conservation Program**

The Great Plains Conservation Program, launched in July 1957, supplements other conservation programs and activities in 355 designated counties of the 10 Great Plains States. Sixty-seven additional counties are eligible for designation in this area, which has historically been a high-risk area plagued by severe droughts, high winds, and intense rainstorms. The Secretary of Agriculture designates counties for program participation on recommendation of each State program committee through the Administrator of the Soil Conservation Service.

This is a long range, voluntary program designed to assist farmers and

ranchers develop and carry out their conservation plan of operations, to aid in bringing about greater economic stability, and to protect the land from further erosion and deterioration. Contracts, of 3 to 10 years, assure farmers of certain cost-share assistance, based on a planned time schedule for the application of enduring conservation practices and land use changes provided for in their complete conservation plans.

The first contract, including complete conservation plan and cost-sharing agreement, was signed in December 1957. By December 31, 1960, cost-sharing contracts had been developed with 5,586 farmers on 14,880,500 acres of land. As of June 30, 1960, the plans of operations developed and made a part of the contracts provided for the conversion of 449,000 cropland acres to permanently vegetated rangeland or other noncropland use, and specified the reseeding of 481,800 acres of rangeland.

## AGRICULTURAL CONSERVATION PROGRAM

The Agricultural Conservation Program (ACP) shares with farmers the costs of authorized conservation work on farms. The program, initiated in 1936, is administered in the field by farmer committees. Many conservation groups such as those in forestry, agronomy, engineering, hydrology, irrigation, pasture management, and wildlife management correlate ACP with their activities.

Program trends since 1957 include the expansion of forestry conservation on farms, an increase in the percentage of cost-share funds used for measures with enduring benefits to 88 percent of the total, and greater correlation with soil conservation district and small watershed conservation programs.

During 1958-60, the ACP helped more than 1 million farmers a year plant more than 1 million acres of trees (see Forestry, p. 59), establish 7 million acres of permanent-type vegetative cover, increase the extent of grasses and legumes in regular crop rotation by 3 million acres, stripcrop more than 1 million acres, terrace 2-1/2 million acres, perform conservation drainage for 5 million acres, control competitive shrubs on 5 million acres, construct 180,000 water storage reservoirs, and carry out many other soil, water, and woodland conservation practices.

Since ACP bears only about one-half of the cost, the resulting total investment in approved soil and water conservation work is approximately double the ACP assistance. The total amount of ACP funds received by farmers and ranchers in the 3-year period was about \$640 million. Of this total, amounts used in certain categories (some overlapping between categories), 1958-60, were approximately as follows:

- (i) For vegetative cover and soil amendments for soil and water conservation on farms, \$325 million.
- (ii) In developing and managing range and pastures, to improve and establish vegetative cover, control competitive plants, improve distribution of livestock, manage forage by fences, and provide



water developments such as springs, wells, ponds, pipelines, and storage facilities, \$115 million.

- (iii) In serious wind erosion areas, to install control measures such as stripcropping, windbreaks, and shelterbelts, to manage crop residues, and to perform special tillage operations, \$21 million.
- (iv) In conserving and encouraging proper use of water, for practices such as lining irrigation ditches, leveling irrigated land, reorganizing irrigation systems, installing small water storage projects, and constructing dikes or spreaders, \$52 million.
- (v) In managing and using water primarily in the humid areas, to help install practices such as contour stripcropping, contour planting, grass waterways, protective vegetative cover on gullies, ditch banks, dikes, levees, terraces, erosion control structures, stream channel protection, and open ditch and tile drainage systems, \$100 million.
- (vi) In officially authorized flood control and watershed protection and flood prevention watersheds, for land treatment measures, \$30 million.

In addition, the county committees transferred more than \$22 million of ACP funds to other agencies which provide service for soil, water, and woodland conservation measures requiring engineering or other technical guidance to the farmers and ranchers.

Special funds for emergency conservation measures in disaster areas were appropriated by the Congress to share costs of approved emergency measures to control wind erosion on farmlands, or to rehabilitate farmlands damaged by wind erosion, floods, hurricanes, or other natural disasters. In such disasters, cost-sharing assistance was as high as 80 percent of the cost.

During the 4 program years, 1957-60, \$6.5 million of these emergency conservation funds was used, principally due to flood damage, in 203 counties of 14 States to assist with farmland restoration measures including removal of debris, shaping and grading eroded areas, restoring erosion control and water storage structures such as terraces, diversions and ponds, repairing damaged drainage and irrigation systems, and cleaning and stabilizing drainage channels.

In some areas having special economic problems, ACP cost-sharing and operating procedures were adjusted to help meet the needs of farmers with underused labor, land, water, or woodland resources. The State and county committees, with other agency representatives and the farmers, determined the most needed conservation practices which would help these farmers better use their resources and increase their income, such as the establishment of improved pastures or improved management and harvesting in the woodland areas. In some counties, higher rates of cost-sharing were offered to these farmers to carry out a specified amount of the selected practice.

## RESEARCH PROGRAMS

### Soil and Water Conservation

The soil and water conservation research program of USDA's Agricultural Research Service is carried on in cooperation with the various State agriculture experiment stations. It is conducted largely in response to the research needs of the Soil Conservation Service, and reflects the needs of the American farmer.

Here are some research highlights of the 1958-60 period:

(1) Corn yields are influenced by aerial environment, as well as by such long-recognized factors as soil fertility, soil moisture, crop variety, and crop pests. The rate of photosynthesis of corn plants is determined largely by the rate of carbon dioxide exchange between the air and the corn. Micrometeorological studies have shown that 80 percent of the carbon dioxide needed must come from outside the field by air movement. This movement is increased by air turbulence, which is influenced by the surface presented by plants to the wind. Ways of increasing air turbulence are being studied.

(2) A scientific and practical need has existed for measuring, in soil, the physical condition of water as it relates to uptake by plants. A wet- and dry-junction thermocouple method was developed at the U. S. Salinity Laboratory which can be used to determine the water-binding effects of the soil matrix and the solute. It is now feasible to critically examine the general hypothesis that total suction of soil water is related to plant growth.

(3) A new and simple method for determining soluble sodium was developed at the U. S. Salinity Laboratory. It consists of measuring the voltage produced when a calomel electrode and a special glass electrode sensitive to sodium are placed in the test solution.

(4) Ways are being investigated to increase agriculture's water-use efficiency. Studies show that about half the water used in evapotranspiration is directly evaporated from the soil surface. Ways of reducing this evaporation, such as the use of plastics, changing planting patterns, and increased fertility efficiency, are being investigated. For example, under dryland farming conditions it may be possible to cover, with plastic, ridges spaced throughout the field to accumulate water in the furrow for greater depth of water penetration.

(5) Soils act as reservoirs for moisture and enable plants to use the stored water and grow between rains. Ways of increasing water infiltration and storage are being investigated. For example, research in Oklahoma has shown that it is possible to save much of the runoff that frequently occurs during heavy summer storms by leveling a portion of the land to form benches. These benches, known as Zingg Conservation Benches, catch and hold runoff water for infiltration.

(6) Data accumulated from the start of the Soil Erosion Experiment Stations, 8,000 plot years of runoff and soil loss records, have been tabulated. Both runoff and erosion equations of sufficient accuracy were

developed from these data for adjustment of individual storm runoff and soil losses with variations in rainfall characteristics. Tests show that estimates of average erosion losses computed from these data are sufficiently accurate to serve as a sound basis for conservation farm planning.

(7) Sodid (alkali) soils can be reclaimed by the use of sea water or other high-salt waters of similar composition. By diluting sea water with irrigation water and leaching the soil the high electrolyte content of the sea water floculates the soil, thus increasing its permeability.

(8) In irrigation agriculture, canal seepage losses are of considerable concern. Seepage losses in farm irrigation ditches may be as high as 50 percent of the farm-delivered water. A prefabricated asphalt-coated jute canal liner has been developed at Logan, Utah, that can be installed by the farmer to control these seepage losses.

(9) Plastics for reducing evaporation from farm ponds show considerable promise in Utah. Floating black plastic film promises to be outstanding for improving farm pond water quality through algae control. Vinyl plastic-lined mole drains provide a relatively low-cost and effective means of draining excess water and crop-damaging salt from soils.

(10) Investigations of fertilizer materials prior to 1958 led to the product urea-form, a slowly soluble nitrogen fertilizer. Adequate methods of analysis for determining the quality of this material and the biuret content of urea were developed in cooperation with the Association of Official Agricultural Chemists and certain producers of these synthetic nitrogen fertilizer materials. Investigations of other fertilizer materials show that fast-growing crops are influenced significantly by the solubility of the phosphorus in relation to the particle size of the fertilizer.

## Water Conservation

Water problems are becoming more acute and widespread as the demands of our growing population, agriculture, and industry press ever nearer to the potential limits of the water supply which Nature provides. This situation has led to increased emphasis on research pertaining to water conservation measures. Brief descriptions of some of these major research activities conducted by the Bureau of Reclamation, U. S. Department of Interior, in the 1958-60 period follow:

Evaporation Reduction. --Significant progress has been made in investigating the feasibility of controlling evaporation from open reservoirs by the use of a monomolecular chemical film. In 1958 large-scale evaporation tests were conducted by Federal, State, and local agencies at Lake Hefner, part of the municipal water supply system of Oklahoma City, Okla. Although unfavorable winds and other circumstances prevailed during the tests, a 9-percent reduction of evaporation loss was achieved through the use of a monomolecular layer of hexadecanol on the reservoir surface. In 1959 and 1960 screening tests were continued on various fatty alcohols and other film forming material. Moreover, a new method by scientists of the Bureau of Reclamation's Engineering Laboratories at Denver, Col., by which melted material is supplied from automatic dispensers, was developed for use in reservoir evaporation reduction tests.



Evapo-Transpiration Reduction. --A major area for water saving is in the reduction of transpiration from worthless plants. Water-loving phreatophytic and hydrophytic plants along western streams of the United States cover nearly 16 million acres in their entirety and are expanding rapidly. This vegetation may discharge from 20 million to 25 million acre-feet of water into the atmosphere annually. Salvage of even a small part of this water could have a marked and appreciable effect on the water economy in the Western States. Estimates of potential savings range from 6 million down to 1 million acre-feet using presently known methods. Estimates of costs of first clearing range from \$40 to \$100 an acre, with up to \$7 an acre annually for maintenance.

The Bureau of Reclamation and the Agricultural Research Service are cooperating in studies for control of woody phreatophytes and also in the control of undesirable aquatic weeds which create irrigation operation and maintenance problems and result in water losses through transpiration and seepage.

Much progress has been made in reducing costs and water losses due to weeds on irrigation systems in a comparatively short time. It is estimated that in fiscal year 1960 the losses due to weeds on irrigation systems were reduced several million dollars annually as compared with 1948. However, all weed problems have not been solved as economically as desired and research is being continued to assist in surmounting this major problem.

Seepage Control. --An obvious field for water savings lies in reduction of seepage from reservoirs, canals, and other conveyance works on irrigation projects. Seepage can be satisfactorily reduced by installing relatively impervious linings, or by the construction of closed conduits. The Bureau of Reclamation is aggressively pursuing investigations of materials and methods to reduce the costs of canal linings.

In 1958, 1959, and 1960 studies have included the use of unreinforced concrete, natural and artificially introduced sediments, soil cement, compacted earth, asphalt, and prefabricated asphaltic linings. In addition, representative specimens of assorted plastic products obtained from manufacturers have been tested as possible materials adaptable to low cost prefabricated canal linings. The tests indicate that the more common polyethylene and vinyl plastic films of 0.008 inch minimum thickness are potentially satisfactory materials for buried membrane linings. A major break-through in research was the development of low cost linings consisting of bituminous materials, including buried asphalt membrane lining, as substitutes for more expensive linings. Plastics, as experimental buried membrane linings, appear to be as effective as other buried membranes after more than five years of use.

Saline Water Conversion. --In 1952 the United States Congress enacted into law the Saline Water Act, which provided for research and development by the Department of the Interior, Office of Saline Water, to develop low-cost methods for de-salting sea and brackish water. Provision for cooperation with the following agencies is included in the Act: The State of California, Department of Defense, Atomic Energy Commission and the Office of Civil and Defense Mobilization. Congressional legislation in 1958 authorized \$10

million for the construction and operation of five saline water conversion plants to demonstrate the reliability, engineering, operating, and economic potentials of the most promising of the presently known processes. This work is under the direction of the Office of Saline Water. The processes and sites for the demonstration plants are as follows:

Long tube vertical multiple-effect distillation, Freeport, Texas.  
Multistage flash distillation, San Diego, Calif.  
Electrodialysis, Webster, S. Dak.  
Forced-circulation vapor compression, Roswell, N. Mex.  
Freeze demineralization, Wrightsville Beach, N. C.

One potentially promising new conversion process involves the use of gas hydrates such as light hydrocarbons and halogenated methanes and ethanes. Essentially, the process consists of contacting saline water with a liquid hydrating agent, separating the crystalline hydrate formed under the proper conditions, and washing and decomposing the hydrate into pure water and the hydrating agent.

Another new system under study utilizes a combination of electrodialysis and resin-bed treatment, made possible by new materials and techniques which may minimize the inherent difficulties of each process. The proposed method utilizes conductive ion exchange materials which can be regenerated by means of an electric current and ion selective membranes to reduce the tendency of mixing the two solutions.

Work on determining the practicality of the osmionic-conversion process has been continued. This method is somewhat similar to electrodialysis except that no electrodes or outside electric current is required.

Many formidable problems still must be solved before economically competitive fresh water can be obtained from the sea. The most efficient sea water conversion plant produces 2.8 million gallons of fresh water per day at a cost of about \$1.75 per thousand gallons. This is far too expensive to be considered as a source of supply for any area where natural fresh water is readily available. Substantial strides have been made in the search for new or improved saline water conversion processes. The plants under construction by the Office of Saline Water will incorporate many of the latest process developments. Utilizing this new technology, these plants are expected to produce fresh water from the sea in the range of \$1 - \$1.25 per thousand gallons.



# Marketing Farm Products

## REVIEW OF DEVELOPMENTS

The total cost of marketing domestic farm food products in the U. S. was 12 percent higher in 1960 than in 1957 and 65 percent higher than in 1950. Part of the increase was caused by more food moving through the marketing system, and part was caused by higher unit charges for services that food marketing firms provide.

Six percent more food moved through marketing channels in 1960 than in 1957. Since 1950 the volume of food marketed has risen 26 percent. The volume of food marketed increased faster than population which increased 19 percent during the 1950-60 period. This faster rate of growth can be attributed partly to migration of people from farms and to the fact that more farmers bought food rather than produce it themselves.

Unit charges for marketing farm food products increased 6 percent from 1957 to 1960 and 32 percent from 1950 to 1960. Much of the increase in charges can be traced to higher wages. However, labor costs per unit of product marketed did not rise as fast as wages because output per man-hour increased.

Other factors that have contributed to the higher cost of marketing are:

1. More food was eaten in restaurants and other eating establishments.
2. Factory output of food increased and new processed food products were introduced. Many of the highly processed foods also had more expensive packaging costs.
3. More services were associated with food purchases, such as super-market parking lots, more elaborately decorated stores, package pickup stations, longer shopping days, and built-in savings in the form of trading stamps and premiums.

On the other hand, increases in marketing efficiency checked the rise in costs of marketing some products. Integration in poultry and livestock production shortened marketing channels for these products, saving some handling costs. Marketing channels for many other food products also were shortened by elimination of one or more intermediaries. Large grocery chain operations illustrated how some intermediaries were bypassed. Many independent grocers joined voluntary organizations enabling them to enjoy some of the vertical integration benefits in distribution.

Railroads adopted practices that encouraged shippers to load freight



cars heavier to obtain lower transportation costs per unit. Railroads and motor-trucking firms cooperated in establishing "piggyback" systems that combined rail and truck transportation. The truck trailers were hauled on railroad flatcars between distant terminals. Then the trailers were unloaded from the flatcars and hauled by "tractors" to their final destination. In this way shippers were able to take advantage of the flexibility and direct delivery of trucks and the speed and low cost of long-distance rail shipments.

Sales of nonfood items in grocery stores increased substantially. The more of these items grocery stores sold, the easier it was for them to combat the upward pressure of increased marketing costs on food prices.

The added services incorporated into the newer processed foods may have reduced marketing costs in some cases. For example, transportation was lower for dehydrated or concentrated products; spoilage was less for frozen vegetables than for fresh vegetables; and better preservation and storage facilities reduced extreme seasonal variation in supplies and prices.

The number of food marketing establishments has been declining in recent years, but total sales of food have been growing. As a result, the average establishment is getting larger. In 1958, the average retail food store had sales of \$168,000 compared with \$130,000 (in 1958 dollars) in 1954. The number of retail food stores declined 10 percent from 1954 to 1958.

The average size of wholesale establishments also increased from 1954 to 1958, but numbers stayed about the same. There seemed to be a trend among independent wholesalers toward specialization and away from a general line. Retail chains and wholesalers that sponsor cooperative retail chains handled much of the general line business that independent wholesalers formerly handled.

Many food marketing firms merged with other firms or sold out to larger ones. Nine-tenths of the companies acquired between 1952 and 1958 had less than 100 employees. Although many of these companies were proprietorships or partnerships, a large proportion were corporations.

## TECHNOLOGICAL RESEARCH IN MARKETING

Research in marketing has increased physical efficiency by bringing about improvements in operations, facilities, containers, equipment, and work methods.

The objectives of several studies has been the modernization of facilities for the handling of food in specific city wholesale markets to enable greater efficiency in the receiving, storing, processing, packaging, and distribution. These studies have evaluated existing facilities, handling methods, and costs, determined present and probable future needs of the market in respect to product volume, facility location, size, and design; and estimated investment requirements and operating costs, including possible savings. An example is the study of the New York City Wholesale Fresh Fruit and Vegetable Markets for which annual savings of \$10 million would result from the recommended facility improvements.

Mechanization of harvesting operations has accelerated the rate of market deliveries of many farm products, including grain and oilseeds. The speed-up necessitated more rapid handling operations, longer storage in elevators and warehouses, increased need for drying and aeration operations, and increased efficiency in these and other receiving, handling and storing operations. Research studies have been underway to determine the relationship of drying air temperatures and speed of the drying operation to the quality of the products. Aeration systems have been designed for both flat and upright grain storages of different volumes up to one million bushels. Designs have also been developed for small country elevators for merchandising grain.

For other commodities, research has developed warehouses for storing flat bales of cotton, roll-board packing station for citrus fruit, pallet box filler for handling apples, layout for one-bed cattle slaughter plants, and an improved method for eviscerating chickens.

In the wholesale and retail distribution of food, detailed studies have brought about improved warehouse layouts, better handling operations, and more efficient retail store operations, especially in the preparation and handling of perishables.

Extensive work has been done in developing and evaluating improved shipping containers and consumer packages that will be less expensive and afford better protection in the handling of fresh fruits and vegetables.

In the field of transportation, major attention has been given to improved equipment especially for the shipment of perishables. Methods have been developed for testing and rating the performance of refrigerated trucks and trailers, and for improving loading methods of truck and rail shipments of many commodities.

## RESEARCH TO EXPAND MARKETS

Sixteen studies relating to consumer use and preference for farm products were reported in 1958-60, nine of which were national in scope. Seven of the studies were continuations of investigations in the textile field, with particular reference to the changing competitive status of cotton and wool in apparel, household, and industrial uses compared with synthetic fibers. The remaining studies dealt with food products, including citrus and subtropical fruits, poultry, eggs, canned and frozen foods, apple-juice concentrates, and all foods used in in-plant feeding programs.

Marketing researchers also undertook economic studies of market potentials for new or improved agricultural products. Basic studies were completed on potentials for oils and fats in prepared animal feeds, synthetic lubricants, and plasticizers. Market potentials were also evaluated for partially acetylated cotton and cotton linters. Market tests were made for precooked rice, sour cream, and cottage cheese of known quality. A preliminary investigation was made of the economics of producing and distributing bread in frozen form.

Other ways of merchandising and promoting farm products were studied. Controlled experiments were conducted to determine ways of maximizing sales of various fruits, canned foods, mayonnaise, and salad dressing using variations in types and sizes of packages, bulk displays, and shelf locations in self-service stores. A complete inventory of food products in retail stores was made through a special sampling procedure. Practices relating to merchandising of lamb, poultry, citrus, and other fruit products were ascertained. A least-cost method for measuring accurately weekly retail sales of semiperishable products such as apples and winter pears in given cities was developed. Artificially sweetened grapefruit juice was taken out of the dietetic department and sold successfully along with other canned juices. Customers' shopping patterns in retail food stores were studied. Various aspects of marketing of dairy products were investigated: the effect of automatic vending machines on total milk sales in a community; the effect of increasing sales of nonfat dry milk on sales of fresh, evaporated, and filled milk; and the effect of coupons and special price offers on butter, margarine, and other fats and oils sales. In addition, an annotated bibliography of retail merchandising research of farm products was issued.

Progress was made in developing techniques for determining the monetary results of special advertising campaigns. In addition to the several hundred millions of dollars spent annually by processors and distributors for advertising and other promotion of farm products, farm groups themselves spent close to \$75 million a year.

Studies were made concerning the consumption of milk in school, in nonprofit summer camps, and by children at school and at home in relation to the special milk program (which has the effect of reducing the price of milk to children in nonprofit school cafeterias, child-care centers, summer camps, etc.). Approximately 400 million half pints of whole milk were served to children in public schools below the college level in one month (March 1957). This total was about equally divided between milk served with meals and other servings.

A comprehensive report was prepared showing elasticities of demand for food commodities and food groups with respect to family income and to household size. This was based on the national household food consumption survey, Spring 1955. Another comprehensive report, based on a national sample survey, revealed the nature and extent of the market for individual foods and total food in public schools. For the survey year, ending June 1958, food deliveries to public schools aggregated \$600 million in value, 85 percent of which represented foods purchased locally and the remainder was foods donated under governmental programs.

## RESEARCH INTO QUALITY MEASUREMENT AND MAINTENANCE

An extensive research program has been conducted to develop improved methods and equipment for measuring quality in agriculture products. Special effort has been made to develop objective tests that are more accurate and rapid than subjective tests used. The following are examples of some accomplishments in this field.



Five accurate and rapid methods for measuring the smut content of grain were developed -- a light transmittance method; sedimentation method; catalase activity method; light reflectance method; and light absorption method. Some of these are suitable for use by inspectors in routine examinations.

Mechanical samplers have been devised for obtaining representative samples of peanuts either from loaded trucks or as the peanuts are loaded. Mechanical devices also have been developed to automatically shell, split, turn, and count halves for inspection.

An instrument has resulted from research that quickly measures hue, intensity, and relative lightness or darkness of extracted tomato juice, and automatically calculates a color index. The index corresponds closely to judgment of experienced inspectors and is more reliable than human judgment for determining quality of tomatoes for processing into juice.

A simple objective method for determining dispersibility and solubility of nonfat dry milk, as an indication of quality, requires only 10 minutes and inexpensive apparatus. It differentiates various grades as precisely as other more complicated methods. The test combines a mechanical method of determining dispersibility and a lactometer procedure for measuring dissolved solids.

A new rapid method for determining protein content of wheat and flour samples has been developed. It consists simply of separating the protein, suspending it in sulfosalicylic acid solution, reading the optical density with a colorimeter, and converting the reading to protein content by the use of special equations or prepared tables.

An "airstream" sorting machine is available that grades 1000-gram samples of natural-condition raisins for maturity and trash content in 10 minutes. The usual hand-sorting required more than an hour and was not as precise.

Research also has been conducted on better methods to maintain quality of food. New chemical treatments have been tested to prevent or retard deterioration and spoilage, and new types of treatments have been tried that do not leave objectionable or harmful residues.

Methods have been developed and adopted commercially for predicting the storage life of different lots of grapes and apples a few weeks after the fruit is stored. This makes it possible to market the fruit in an orderly manner so that the lots that are likely to decay first may be marketed early while still in good condition. Only the best lots are retained in storage for late marketing.

Research with cannery peaches has shown that less rhizopus decay develops in fruit that is put in cold storage for 10 to 14 days before ripening than in fruit that is kept continually at ripening temperatures. This method of handling peaches has the additional advantage of relieving congestion at the cannery during the height of the picking season.

Improved methods have been developed for protecting wool items during long-term storage. One is to impregnate the cloth with DDT during the sponging process. Another is to insert fiberboard covered with lindane crystals between the layers of cloth. This treatment is effective five years or longer whereas scattering naphthalene flakes through the pack is effective for less than a year.

## EDUCATIONAL PROGRAMS

### Marketing Firm Management

Since 1959, significant progress was made by the Extension Service in conducting workshops and clinics in business management for top management of marketing firms. In addition, extension analyzed individual firms, suggested alternatives for improving efficiency, and utilized these firms to demonstrate the results of these changes to others.

### Federal Orders and Agreements

Increased educational emphasis was given to assisting farmers and marketing organizations in understanding the opportunities and limitations of marketing agreements and orders. The scope of marketing orders and agreements has increased significantly within recent years. Extension personnel have approached this problem area from two directions: (1) they have presented educational materials to farmers and marketing organizations regarding the advantages, limitations, and operations of orders and agreements; (2) they have analyzed specific provisions and alternative provisions of orders and have provided educational information on the probable consequences of the alternatives.

### Foreign Agricultural Trade and Market Development

An educational program on foreign agricultural trade and economic development was sponsored by the Foreign Agriculture Service and the Federal Extension Service in 1959 and 1960. Participation by extension economists in an organized study team of State and Federal representatives provided the basis for important extension activities in approximately 20 States. Information obtained is being used in educational programs to develop a better understanding among American farm and nonfarm people of the situation in other nations of U. S. programs and policies, and of policies and programs needed for effective foreign economic development and market expansion.

## MAIN PROBLEMS STILL OUTSTANDING

Technological research in marketing is needed in respect to many problems for which little or no work has yet been done. This is particularly true in the case of food processing and manufacturing which is expanding rapidly. Studies are needed to evaluate the comparative efficiency of different designs of processing facilities and equipment in relation to plant location, volume handled, and utilization of labor. The possibilities of further mechanization and automation in processing should be studied.

The place in the marketing channel where many fresh fruits and vegetables can most economically and effectively be prepackaged is not yet known and needs special attention.

There is a growing need for systems engineering in marketing and processing to integrate a series of operations to maximize overall efficiency.

Most prepackaged meat is now cut and packaged in the retail store. Possible economies of centralized meat cutting and packaging requires study.

While most technological research in marketing falls within the fields of applied research there is need for more basic research in the physical sciences to deal effectively with some of the problems. For instance, the proper design of grain storage facilities requires basic research to develop needed data on the pressures exerted and loads imposed by bulk grain on walls and floors of storage structures.

Research on the coordination of transportation is needed so that commodities can be more economically transferred from one mode to another with a minimum of handling operations. The potential of air transportation to expand the marketing of specialty crops in distant markets is another area needing study.

There is an increasing demand for a year around supply of a wide variety of high quality agricultural products. Delivery of such products to the markets is dependent to a large extent on better grade standards and improved methods for maintaining quality. Practical accurate methods and instruments are needed for quality control in preparing products for market and for proper enforcement of grade standards. Further advances in methods to maintain quality are necessary.





# Rural Living Conditions

## GENERAL TRENDS

### Farm Population

From 1958 to 1960, the number of U.S. farm residents, as traditionally defined, dropped from 21,398,000 to 20,541,000. However, in 1960 a new definition of farm residence was introduced because many people with no significant association with agriculture were included in the farm population count.<sup>1</sup> Under the new definition, which requires that a place meet minimum standards of acreage and value of products sold, only 15,635,000 persons in 1960 were living on farms--24 percent less than under the old definition. Using the new figure, farm people comprised only 8.7 percent of the total population in 1960.

During the period under review, the farm population continued to decline through heavy out-migration, as it has for over 40 years, except for an interruption by the economic depression of the 1930's. The recent decline was most rapid in the South, especially through reduction in tenant cotton operations. The most basic factors causing continued decreases in farm population size appeared to be inadequate income from small and medium-scale units, reduced manpower required when farms were consolidated or more highly mechanized, and the availability of off-farm employment opportunities.

### Employment

An average of 5.7 million persons including 3 million farm operators, 1 million unpaid family workers, and 1.7 million hired laborers worked on U.S. farms during 1960. This is a drop of about 120,000 in total farm employment since 1958 and 1.8 million since 1950. Declines in numbers of farm operators and unpaid family laborers accounted for the drop in agricultural employment over the decade. Employment of hired farm workers was at about the same level in 1960 as in 1950.

Although average monthly employment of hired laborers is about 1.7 million, from 3.5 to 4 million persons earn some cash wages on farms in the course of a year. Estimates of the hired farm working force include persons 14 years of age and over, who worked at least one day at farm work

<sup>1</sup> Prior to 1960 a person was classified as living on a farm if he considered his place to be on a farm. Beginning in 1960, respondents were classed as farm people only if their places contained 10 acres or more and if at least \$50 worth of farm products were sold annually. Places of less than 10 acres could qualify if \$250 worth of products were sold from them.

for cash wages during the year. Most of the foreign agricultural workers who come into the United States each year for temporary farm employment are not included in these estimates.

Foreign workers brought here through arrangements with Mexico and other nations for seasonal farm work have gradually increased, reaching a total of about 450,000 in recent years. In 1960, the number decreased to 335,000 with over 94 percent from Mexico and the remainder from the British West Indies, Canada, and Japan.

About a third of the hired farm working force are regular or year-round workers employed on farms for 6 months or more during the year. Another third are seasonal workers employed at farm work for from 1 to 6 months. The remaining third of the hired farm working force, consisting, for the most part, of young persons and housewives, are employed for less than one month and usually work only during the peak of the harvest. Many farm workers supplement their farm earnings with wages earned at nonfarm jobs and short-term seasonal workers often earn most of their income from nonfarm jobs.

Excluding the casual workers who are employed less than 25 days during the year, the average hired worker earned about \$6.00 per day in cash wages and worked an average of about 138 days at farm wage work in 1959. These workers also averaged \$9.00 per day for 23 days of nonfarm wage work for a total year's earnings from wages of slightly over \$1,000. Over 12 percent of all hired farm workers were employed 250 days or more on farms in 1959. They earned an average of \$2,125 for 318 days of hired farm work.

About 12 percent of the hired farm working force and domestic migratory workers, who temporarily leave their homes to work in the harvest or do other farm jobs in areas beyond daily commuting distance. Migratory farm workers earned about \$710 for 119 days of farm wage work and an average of \$200 from nonfarm wage work, making a total of about \$910 from farm and nonfarm wage work during the year.

Increasing attention was given to the problems of migratory farm workers by the Federal and State Governments. In 1956, federal legislation was enacted establishing standards of safety and comfort in the interstate transportation of migratory workers. The President's Committee on Migratory Labor, described in the previous FAO report, continued coordinating the activities of Federal, State, and local groups on behalf of migratory workers. The U. S. Congress has under consideration a number of bills designed to improve the living and working conditions of domestic migratory workers and their families.

## Level of Living

Preliminary results of the 1959 Census of Agriculture showed that between 1954 and 1959 substantial improvements took place in the level of living of farm families. In 1959, about 2 out of 3 farm families had a telephone, 8 out of 10 owned an automobile, and over half (56 percent) had a home freezer. Over a third (35 percent) of all farms reported ownership of 2 or more tractors. Ownership of television sets was reported by 73 percent of

all farm families in 1959, an increase from the 63 percent reported in 1957. Ninety-seven percent of all U. S. farms had electricity in 1960.

Farms in the North and West most frequently had facilities such as telephones, home freezers, and automobiles. Farms in the South less often reported such facilities. For example, 45 percent of Southern farms had telephones compared with 81 percent of farms in the North and West; 67 percent of Southern farms reported automobiles, compared to about 90 percent of farms in the North and West.

## Health Services

Although health facilities available to the rural-farm population increased in recent years, there are still important differences in the availability and utilization of health services between farm and nonfarm populations.

In 1959, there were about 165 physicians for every 100,000 persons in the civilian population of the larger metropolitan areas, but in isolated rural areas there were only about 51 physicians per 100,000 population. In relation to populations, persons in the isolated counties had only a third as many full-time specialists and full-time physicians in hospitals as persons residing in metropolitan and adjacent counties.

Information from the National Health Survey indicated that, in 1959, 45.0 percent of all persons living on farms were covered by hospitalization insurance, compared with 71.5 percent of all urban persons and 68.0 percent of all rural-nonfarm persons.

Limitation of activity due to some chronic condition was more prevalent among rural-farm residents than other persons. For example, 12.4 percent of the rural-farm population, but only 9.6 percent of the nonfarm population reported limitation of activity due to chronic conditions. Among the economically active population, rural-farm persons lost an average of 8.6 days of work per year due to illness, compared with an average of 6.1 work-days lost by nonfarm persons. On the average, rural-farm residents reported fewer visits to physicians and dentists than did either urban or rural-nonfarm persons. Rural-farm residents averaged 3.8 physician visits per year compared with an average of 5.3 for urban residents and 4.9 for rural-nonfarm residents.

## Education

Despite general improvement in the level of educational attainment, the rural-farm population is still at a relative educational disadvantage. In 1959, the median years of schooling completed by persons 25 years of age and over were 8.7 for farm residents and 11.1 for nonfarm persons. About 22 percent of all rural-farm persons 25 years of age and over had completed at least a high school education, compared with about 36 percent of the nonfarm persons.

Ninety-eight percent of the population in the United States are literate, but inability to read and write is still more common among farm than non-farm persons. Thus, 4.3 percent of rural-farm residents 14 years of age



and over, but only 2.2 percent of rural-nonfarm persons and 1.7 of urban persons, were illiterate in 1959. About 5 percent of farm operators and 12 percent of farm laborers were illiterate. Part of the difference between farm and nonfarm persons in literacy was due to the relatively high proportion (14.3 percent) of rural-farm nonwhites illiterate.

A nationwide survey conducted in 1959 showed that about half of all high school seniors in nonfarm areas, but only about a third of rural-farm high school seniors, had definite plans to attend college in 1960.

Thus, although educational differences between farm and nonfarm persons have narrowed in recent years, there are indications that important distinctions in educational attainment and educational plans still persist.

## THE 4-H PROGRAM

4-H Club work is the youth program of the U. S. Department of Agriculture. It is headed by the Cooperative Extension Service teamed with the State Land-Grant colleges and county governments. More than 2,296,000 young people, 10 to 21 years old, belong to about 94,700 local 4-H Clubs in the 50 States and Puerto Rico. Of these, during the 1958-60 period, 57 percent were from farm homes, 26 percent from rural non-farm, and 17 percent from urban areas. About 302,500 volunteer adult leaders, trained by professional Extension workers, and 110,000 junior leaders guide local club activities.

Each 4-H'er enrolls in one or more "learn by doing" projects in farming, homemaking, and community service. The boys and girls raise livestock and poultry, grow gardens and field crops, conserve the soil, sew, cook, practice safety, and improve their homes. They apply the latest research in home economics, agriculture, and other fields--and learn the "why's" as well as "how's" of what they do. In food production, they emphasize quality rather than quantity; in food preparation and conservation, they stress health and nutrition. The head, heart, hands, and health program has long been an effective means of getting information on better farm and home practices into the homes of the Nation.

All 4-H'ers receive special training in leadership and citizenship. Character-building and citizenship-development are long-range goals. Each year's National 4-H Conference held in Washington, D. C., attended by delegates and leaders from all the States, focuses on citizenship and returns its participants to their home communities better prepared to strengthen State-wide and national citizenship programs.

The 4-H Club plan has now been adapted to suit different needs and conditions in more than 50 countries around the world. The International Farm Youth Exchange has helped spread the idea. Through "IFYE," scores of young men and women take part annually in the farm, family, and community life of each other's countries. In the 13 years through 1960, the number of outbound IFYE's totaled 1,325 from 47 States and Puerto Rico. Those inbound totaled about 1,490 from 61 countries--with about 20,000 families at home and abroad serving as IFYE hosts. The Exchange has been

attracting widespread attention as a pioneer youth exchange organization, several phases of which are serving as a model for the President's Peace Corps.

Both directly and indirectly, 4-H strives to promote understanding and friendship among peoples of other lands.

## RURAL DEVELOPMENT PROGRAM

In the 1957 report to FAO, background was given on the establishment of a rural development program to attack the problem of poverty in certain parts of the United States. A Federal interdepartmental "Committee for Rural Development Program" was set up to coordinate the work at the national level. States concerned also organized "Rural Development Committees", made up of agencies and organizations working in the program within individual States.

Localities selected for the program by the State Committees formed county or area committees, comparable in organization to the State Committee but functioning to provide day-to-day leadership at the local level.

Funds were provided by the Department of Agriculture, through State Agricultural Extension Services, for necessary administrative organization of the program within the chosen localities. In addition, the Department supplied modest funds for research, conservation, and general administration in support of the program.

The Rural Development Program got under way at the local level in 1957 on a pilot basis, that is, committees were set up locally, priorities selected, and Extension Service workers assigned, to help coordinate services of agencies and groups working in the program. About 60 "pilot" or "demonstration" programs were organized in 30 States and Puerto Rico.

During the period 1957-60, the program was expanded to a nearly nation-wide basis. At the close of 1960, approximately 40 States had the work under way or in the planning stage. About 250 counties, most of them smaller, rural counties, were involved in designated areas.

A wide range of projects were reported by leaders in these localities. The latest report on the Rural Development Program published September 1960 cited "more than 2,000 projects (in the program area) to improve farms, build new industries, and expand existing ones, help both youth and adults to obtain the training they need, improve health and accomplish other aims."

Among the projects reported by the participating areas were these:

- (i) In a six-county Rural Development area of Missouri some 1,300 jobs will result from industry expansion, with an increased payroll of \$2,750,000. Local leaders, banks, and the U. S. Small Business Administration are supplying needed capital. In one county, leaders formed an industrial development corporation, raised \$100,000, purchased land, and built a small factory.

- (ii) A market for vegetables in Beckley, W. Va., which serves three Rural Development Program counties was reorganized and a long-term plan developed to provide enough produce for an efficient operation. In Puerto Rico, Rural Development has doubled sales of a local produce market built previously by the Commonwealth's Department of Agriculture.
- (iii) Crawford County, Ind., is typical of many areas with successful health improvement programs under auspices of Rural Development. Some 300 local people volunteered their help in a county-wide health study. This project has renewed interest in health improvement, encouraged the assistance of health agencies, and proved useful in industrial promotion of the area.

In the first few months of 1961 two actions were taken of major importance to the long-term future of "Rural Development" in the United States.

Late in March, the new Secretary of Agriculture established a Rural Areas Development Board with the aim of using Department of Agriculture services to promote organized programs of economic development wherever practicable in rural areas.

Thus the Rural Areas Development Program is planned as a major Department of Agriculture activity which will receive priority attention of all offices and agencies concerned. The Department plans to provide needed technical services to State and local agencies and nongovernmental groups, wherever feasible, in operating successful programs of organized rural areas development.

The other major action of great importance in the field of rural development in the United States was enactment of a law, signed by the President May 1, 1961, to aid so-called "depressed" economic areas. This Area Redevelopment Act (Public Law 87-27) authorizes \$394 million in loans, grants, technical assistance, and retraining benefits over a four-year period for areas subjected to chronic unemployment and under employment.

Five broad types of Federal Government aid are authorized in redevelopment areas:

Loans to help finance industrial buildings and commercial projects, including tourist facilities.

Loans and grants for public facilities, such as water and sewage systems and power lines.

Technical aid, through Federal, State, and private agencies, to communities for surveys of resources and program planning.

Retraining grants to enable workers out of jobs and small farmers to upgrade their skills or gain new skills.

More flexible Federal urban renewal aid in redevelopment areas.



Farming and other rural communities with chronic and serious under-employment among a large number of the adult population will benefit from the Redevelopment Act. Loan funds totaling \$100 million for industrial and commercial projects are specifically earmarked for such areas. In addition, they will also benefit from the other provisions of the Act.

The promotion of organized, locally directed "Rural Development Programs" taken in their broadcast meaning, has thus become a major domestic policy objective of the U. S. Government. Initial "pilot" approaches of 1957 have evolved into the greatly intensified program which the Federal Government has initiated, in cooperation with States and local private nongovernment groups.

### HOUSING LOANS FOR FARMERS

Three government agencies are involved in making or insuring housing loans to farmers to finance the construction and improvement of farm houses and other farm buildings.

The Farmers Home Administration makes direct loans to farm owners to finance the construction and improvement of houses and other farm buildings for themselves and their tenants. Farm housing loans made between June 30, 1959, and June 30, 1960, totaled \$40,736,000; between 1958-59, \$60,674,000, and between 1957-58, \$33,066,000. The comparable total for fiscal 1961 was \$70,341,000.

An owner of a farm in production that will produce annually at least \$400 worth of commodities for sale or home use may use the farm housing loan funds to construct, improve, alter, replace, or repair houses and other essential farm buildings or to provide water for household and farmstead use. Loans are made for 33 years or less at 4 percent interest.

The Veterans Administration can guarantee up to 60 percent of the amount of loans made by private lenders to veterans to construct, purchase, alter, modernize or repair farm homes. Loans may be guaranteed up to 60% of the loan amount but the guaranteed portion may not exceed \$7,500. They also can guarantee 50 percent of the amount of a loan with a guaranteed limitation of \$4,000 for building and constructing nonresidential farm structures. Veterans have up to 30 years to repay these loans which bear 5-1/4 percent interest.

The Federal Housing Administration can insure a loan up to \$9,000 to a rural family to build or purchase a farm home on a lot of 5 acres or more which is adjacent to a public highway. Loans are made for periods up to 30 years at 5-1/2 percent interest. They can also insure loans up to \$3,500 for modernizing and repairing farm houses and for building nonresidential farm structures. These loans are made for periods up to 5 years, usually without security. The financing charge amounts to about 9.4 percent.

### SOCIAL SECURITY COVERAGE

Farm workers were first covered under the old-age, survivors, and disability insurance program in 1951, 14 years after the program had gone

into effect for wage earners in commerce and industry. While only the cash wages of farm workers meeting specified requirements for regular employment for at least 5 months with a single employer were brought under the program in 1951, coverage was later extended to more farm wage workers, operators, and certain landlords. Since 1956, practically all people who depend primarily on farming for their livelihood have been covered. In 1959, about 1.9 million farm wage workers qualified for Social Security coverage, and 2.2 million farm operators.

## Nature and Scope of OASDI

Old-age, survivors, and disability insurance (OASDI) is a national social insurance program administered by the U. S. Government. Under this program, employees (and their employers) and self-employed people pay social security taxes related to their annual covered earnings up to \$4,800 while they are working; and when earnings are lost because of retirement in old age, permanent and total disability, or death, benefits are paid to replace in part the lost earnings. Eligibility for old-age, survivors, and disability insurance protection depends on participation in covered work for a specified time (with a minimum of six and a maximum of 40 calendar quarters), and benefit amounts are related to the individual's former average earnings in covered work. Retirement age is 65 for men and 62 for women. At age 72 old-age benefits are payable even if the worker has not retired.

## Farm Operators

The self-employment earnings of farm operators and certain farm landlords are covered under the same general provisions of the social security law as those of the nonfarm self-employed people. A farm landlord's income received from his tenant is considered to be work-related, and is counted as covered earnings under the old-age, survivors, and disability insurance system, if in accordance with the rental agreement the landlord "materially participates" in the production or management of the production of the farm commodities on his land. Generally speaking, a landlord "materially participates" if his activities have a significant effect on farm production.

In computing "net earnings" for social security purposes, farm operators and landlords follow the basic provisions of the Federal income tax law for computing net earnings derived from a trade or business. Generally speaking, every farm operator and "materially participating" farm landlord whose net earnings from all covered self-employment amount to \$400 or more in a year must report his earnings and pay the social security tax. Then he receives credit for a full year's coverage under the old-age, survivors, and disability insurance program.

## Farm Workers

A farm worker's earnings are covered and are to be reported by the employer, if the worker meets the requirements of the coverage test as modified by the 1956 amendments, i. e., the worker is employed on 20 or more days during a calendar year by an employer and paid on a time basis--

per hour, day, or week--or he is paid \$150 or more in cash wages by an employer during the year. This provision extends the protection of the program to most employees who ordinarily earn their living by farm work or by a combination of farm and nonfarm, but has the effect of excluding most short-term casual, and incidental farm workers.

Usually the farm operator is the employer of the workers on his farm but under some circumstances the farmer may use the services of a farm labor crew headed by a crew leader or labor contractor. The crew leader or labor contractor is considered to be self-employed and the employer of the crew if he (1) furnishes the crew members to the farmer and (2) pays them, either on his own behalf or for the farm operator. There is, under the law, a presumption that the crew leader is the employer unless the farmer and the crew leader have a written agreement that shows that the crew leader is the farmer's employee. Since crew members may work longer with a crew leader than with any one farm operator, the crew leader provision makes it possible for some crew members to have more of their earnings covered under old-age, survivors, and disability insurance than would be covered if the worker was the employee of the operator of each farm on which he worked.

## TENURE STATUS OF FARM OPERATORS

Preliminary data from the 1959 Census of Agriculture show a continuation of the steady decline in total numbers of farms in the United States, a decrease in the percentage of the total operated by tenants, and an increase in the percentage operated by part-owners. The rate of tenancy in 1959 was 20 percent, a decline of 4 percent from 1954 and a lower proportion than for any Census since 1880, the first year for which data on farm tenancy became available. For the first time since 1940, the total number of part-owner farms decreased, although in relation to other tenure classes they continued to increase and made up 22 percent of all farm operators in 1959. The two other major tenure classes -- full owners and managers -- showed a negligible change in relative importance. Full owners operate 57 percent of the farms and managers operate less than one percent.

The decline in sharecroppers was particularly great in the period 1954-59, when the total number of sharecroppers dropped by more than half.

In 1954, part-owner farms averaged 544 acres, compared with 145 acres for full owners and 166 acres for tenants. Although comparable data for 1959 are not yet available, it is expected that the reported average size of farm in each tenure class will show an increase, since the average size of all farms in 1959 increased substantially over 1954 -- from 242 to 302 acres.

The broad tenure changes that have occurred, chiefly a decline in tenancy and an increase in both the percentage and average size of part-owner farms, stem from the efforts and means taken by many farmers to enlarge their farm operations and to achieve more satisfactory levels of income. Many farmers rent land in addition to land they own as a means of extending their capital over a larger operation; many tenants have been able to purchase some of the land they farm.



Other modifications in tenure arrangements have occurred that are not shown in the broad shifts in the tenure classes as defined in the census. For instance, farm operators have made increasing use of land purchase contracts, which enable them to purchase land with a relatively low financial equity. Contracts with processors in the production of specific crops or livestock have grown in importance. Recent changes in the Internal Revenue Code that permit certain small, closely held corporations to be taxed as partnerships have encouraged farm incorporation. However, the limited information available indicates that, of the 3.7 million farms in the United States today, probably not more than 5,000 are incorporated.



## Foreign Agricultural Program

### EXPORTS AND IMPORTS

U.S. exports of farm commodities in calendar year 1960 established new records in both value and volume. The value, totaling \$4.8 billion, was more than 20 percent above each of the 2 previous years, and about 7 percent above the 1957 record. The volume was more than 25 percent above the 1958 and 1959 levels and 17 percent larger than 1957. A summary of export data for 1958, 1959 and 1960 is given in Table 2.

Both foreign and domestic factors contributed to high levels of agricultural exports, not only in 1960, but in the 2 preceding years. Abroad, the economic activity of industrialized countries continued to advance at a rapid pace. Gold and dollar holdings of many industrially developed countries reached record levels. In the United States, there were plentiful supplies of farm products available for export. The payment-in-kind program enabled U.S. cotton, wheat, rice, and feed grains to compete successfully in a number of world markets. For the newly developing countries, short of dollars, the United States continued to make farm products available under the Food for Peace Program, primarily Public Law 480 foreign currency sales.

In the 3-year period ending December 31, 1960, U.S. exports of cotton, wheat, rice, soybeans, tobacco, feeds and fodders, nuts and preparations, poultry and variety meats, and hides and skins gained substantially (value basis).

TABLE 2.--U.S. agricultural exports, calendar years 1958-60

Commodity	1958	1959	1960
Grains and feeds:	<u>Mil. dol.</u>	<u>Mil. dol.</u>	<u>Mil. dol.</u>
Wheat and flour.....	733	770	1,026
Feed grains & products.....	501	590	548
Rice, milled.....	99	102	148
Other.....	78	109	100
Total.....	1,411	1,572	1,882
Cotton.....	656	445	980
Animals and products.....	550	570	575
Vegetable oils & oilseeds.....	390	519	548
Fruits, vegetables, and preparations.....	381	385	389
Tobacco, unmanufactured.....	354	346	378
Other.....	113	118	132
Total.....	3,855	3,955	4,824

Exports which gained moderately included cottonseed and soybean oils, field and garden seeds, vegetables and preparations, live animals, and tallow. There was little change in lard exports, and fruits and preparations declined slightly. Exports of dairy products declined sharply.

Although a large quantity of U. S. farm products move abroad under special government programs, most were sold through commercial channels for dollars. In the past 3 years, 68 percent moved under dollar accounts, averaging \$2.9 billion a year. Six commodities--cotton, feed grains, tobacco, soybeans, fruits, and wheat--accounted for 65 percent of the dollar sales. In 1960, sales for dollars totaled nearly \$3.4 billion, a record for a calendar year.

Most of these dollar exports went to more prosperous countries of the Free World--Western Europe, Canada, Japan, Australia, New Zealand, and the Union of South Africa.

Exports under government-financed programs, which accounted for 32 percent of U. S. farm exports in the past 3 years, moved mainly to less prosperous countries of the world. These were the countries that did not earn sufficient foreign exchange to pay for food and fiber imports. Such exports averaged \$1.3 billion in the 3 years. Six commodities--wheat, cotton, feed grains, vegetable oils, milk, and rice--accounted for over 90 percent.

U. S. imports of farm commodities in 1960, totaling \$3.8 billion, declined 7 percent from the previous year, reversing the 6 percent increase that occurred from 1958 to 1959. Supplementary (competitive) and complementary (noncompetitive) imports accounted for approximately equal shares of the total. On the other hand, in previous years when meat imports were lower, complementary imports made up three-fifths. A summary of data on imports for 1958, 1959 and 1960 is given in Table 3.

Leading supplementary commodities imported were animals, including products; fruits (except bananas); vegetable oils, fats, and waxes; and vegetables, sugar, and tobacco.

Among the complementary commodities, coffee represented the principal import, accounting for over half of the total. Rubber, cacao, carpet wool, and bananas were also major imports. Together, these commodities accounted for slightly over a third of the complementary total in 1960.



TABLE 3.--U. S. agricultural imports, calendar years 1958-60

Commodity	1958	1959	1960
<b>SUPPLEMENTARY</b>			
	<u>Mil. dol.</u>	<u>Mil. dol.</u>	<u>Mil. dol.</u>
Animals and products .....	700	764	644
Sugar, cane.....	520	496	507
Fruits and vegetables .....	140	149	168
Vegetable oils, fats & waxes and oilbearing materials.....	147	175	161
Tobacco, leaf .....	96	100	103
Grains and feeds.....	90	77	71
Nuts and preparations.....	62	67	69
Other .....	183	188	195
Total.....	1,938	2,016	1,918
<b>COMPLEMENTARY</b>			
Coffee.....	1,171	1,097	1,004
Rubber, crude.....	248	383	322
Cocoa or cacao beans .....	172	165	143
Wool, unmanufactured (free, in bond) .....	80	123	112
Bananas .....	69	77	79
Other .....	203	238	247
Total.....	1,943	2,083	1,907
Total imports .....	3,881	4,099	3,825

The United States imported agricultural commodities from more than 125 countries, but in 1960, about three-fifths of imports came from 10 countries, mostly in Latin America. Most major suppliers of U. S. agricultural imports have predominately agricultural economies.

### FOOD FOR PEACE

The Agricultural Trade Development and Assistance Act of 1954, commonly referred to as Public Law 480, became the heart of a Food for Peace program that has been receiving emphasis since 1959. Agricultural commodities exported under the program were worth \$1.3 billion under Public Law 480, and \$150 million under Section 402 of the Mutual Security Act during the calendar year 1960.

Regular sales for dollars (including Export-Import Bank and Commodity Credit Corporation credit sales) continued to account for the bulk of U. S. agricultural exports that totaled a record-breaking \$4.8 billion during the same period. The Food for Peace program accounted for nearly \$1.5 billion of 30 percent of the total.

Programs carried out under Public Law 480, as amended, fall into five categories:

(a) Sales for foreign currency. Title I, Public Law 480, authorizes the CCC to incur costs totaling \$11.25 billion through December 31, 1961, to finance sales of surplus agricultural commodities for foreign currencies under agreements with friendly nations. Authorizations since June 30, 1958, have been available at the rate of \$1.5 billion per year, plus any unused monies carried over the previous period. (Authorized for calendar year 1961 is an additional \$2.0 billion made available by Congress May 4, 1961.) Since the beginning of the program through December 31, 1960, 218 agreements with 38 countries provided for the sale of \$5.2 billion worth of farm products at export market value; \$7.4 billion in total cost to CCC.

During calendar years 1959 and 1960, 76 agreements provided for the sale of \$1.9 billion worth of commodities at export market value, \$2.8 billion in total CCC cost.

(b) Famine and emergency relief. Under Title II of the Act, CCC commodities are made available to meet famine and other emergency relief needs of friendly peoples. Also, authority was furnished on May 14, 1960, (it expires June 30, 1961) to use commodities to fund localized work projects. Cumulative authorizations through December 31, 1960, under this title totaled \$771.3 million at CCC cost. The Title II authorization through December 31, 1961, is \$1.4 billion.

(c) Barter. Title III and the CCC charter act authorize CCC to barter CCC commodities for strategic and other materials produced abroad, most of which is placed in the U.S. supplemental stockpile. Cumulative barter contracts through December 31, 1960, entered into under Title III amounted to \$1,290 million at export market value.

(d) Donations. Title III provides for the free foreign distribution of CCC commodities through U.S. voluntary relief agencies and intergovernmental organizations. Cumulative donations under Title III through December 31, 1960, amounted to \$1,480 million at CCC cost.

(e) Title IV. A new authority, Title IV, was added to Public Law 480 in September 1959. It provides for long-term sales agreements on a government-to-government basis. It is intended to assist the economic development of friendly countries. No agreements had been signed as of December 31, 1960.

## TRAINING OF FOREIGN NATIONALS

Training, consultation, and observation programs for foreign nationals in agriculture, home economics, and related subjects have continued to increase in size and scope during the past 3 years. Numbers of arrivals totaled 2,136 in the fiscal year 1958; 2,433 in 1959; and 2,885 in 1960.

Approximately 70 percent of these people were U.S. sponsored primarily by the International Cooperation Administration and Bureau of Educational and Cultural Affairs of the Department of State. The remaining 30 percent came under their own government or private company resources.

Initially, and for several years, most of the ICA participants came from Europe. Currently more are coming from other regions.

USDA and cooperating Land-Grant colleges train participants under agreements with ICA. USDA participates, as part of the Executive Branch, to further the Mutual Security Program.

The Foreign Training Division of the Foreign Agricultural Service coordinates resources of USDA, Land-Grant colleges, and private agencies. Technical objectives are to equip and encourage participants to effectively transmit new ideas, skills, and knowledge in the economic development of their countries.

Nontechnical objectives are to give participants a better understanding of the United States, its people, institutions, and culture, and of its policies, and operations abroad.

USDA, in cooperation with ICA and other agencies, prepared each year during 1958 to 1960 over 35 prospectuses of special short course training in the United States. The prospectuses were sent to ICA missions around the world from 8 months to over a year before the training began.

Representatives of different countries who came to the United States were trained together in groups of five or more. Sometimes people from 8 to 10 different countries attended the same special course. The grouping of countries brought about improved training, better utilization of resources, and more cooperation.

A total of 86 groups of five or more participants were trained in the United States during the fiscal year 1960.

Since training in some fields can be best accomplished outside the United States, many ICA participants are sent to other countries. Currently over 600 people are trained annually abroad (see table 4).

TABLE 4. --Agricultural participants arriving in third countries, by region in which trained, fiscal years 1955-59

Area of training	1955	1956	1957	1958	1959	1960
Multi-country . . . . .	----	----	----	----	----	51
Far East . . . . .	78	127	183	217	305	231
Europe . . . . .	16	68	77	195	142	188
Near East-South Asia . . .	84	140	113	114	174	108
Latin America . . . . .	18	20	5	4	42	66
Totals . . . . .	196	355	378	530	663	644





## Developments in Forestry

### FIFTH WORLD FORESTRY CONGRESS

The outstanding event in U. S. forestry during 1958 - 1960 was the Fifth World Forestry Congress in Seattle, Wash., held in 1960 under the hostship of the U. S. Government and with the cooperation of many private organizations. Approximately 2,000 delegates from 65 countries and 9 international organizations participated. Of these, 725 came from outside the U. S. During the technical sessions, 450 papers were presented. The Congress theme was "Multiple Use of Forest Lands," a concept that has world-wide application. Forest and related areas are managed to conserve and develop basic land resources as a whole. Water, timber, forage, and wildlife, are harmoniously blended for the perpetual use and benefit of the greatest number of people. While the concept is not new, during the past few years it has gained increased support and intensified public interest.

The Congress promoted better understanding of world forestry problems and increased international cooperation in their solution.

### NEW LEGISLATION

Significant Federal legislation included the Multiple Use - Sustained Yield Law, enacted in 1960. It gives a firm statutory basis for full development of all national forest resources to serve the American people. The law states "that it is the policy of the Congress that the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife, and fish." Management of these resources--other than timber--had been authorized through legislative enactments over many years, but nowhere were all of these major resources named in a single statute.

Under legislation establishing statehood for Alaska, the new State is authorized to select within the next 25 years large areas of vacant and unappropriated Federal land for transfer to State ownership. This prospective shift in ownership, and subsequent sales to private individuals and agencies, will make possible the development of both urban and rural communities, with outlying lands devoted to farming, forestry, and other activities, and provide new opportunities in land-resource development for a growing population.

A significant change in private land ownership took place in southern Oregon under a 1958 amendment to the Klamath (Indian) Reservation Act of 1954. With the termination of Federal supervision over the Tribe, some of the Klamath Indians voted to withdraw from the Tribe and to sell their share

of the Tribal lands, largely forested. One portion was sold to a large forest-products industry; other parts were purchased by the Government for additions to existing national forests and as a nucleus of a new national forest; and still other parts will be operated as a sustained-yield forest property by a trust for those Indians who elected to continue under a trust arrangement. This new distribution of Klamath lands may result in increased multiple-use management areas.

## MULTIPLE-USE FOREST MANAGEMENT

The application of multiple-use principles made significant headway during the period. A number of large private owners put into effect multiple-use management of their forest holdings for public recreation, watershed management, and timber, adding to the area managed by public forestry agencies.

The Forest Service inaugurated a program popularly known as "Operation Multiple Use." Its aim is to assure national forest resources will contribute their full potential to the people in pace with the nation's expanding population and economy. It encompasses a 10- to 15-year management and development operation designed to meet not only near-term needs, but those of a much larger population in the more distant future. Under this plan, multiple-use management would be intensified to about double the present levels.

A project was begun on a national forest in one Western State designed to improve the yield of water from forest and range lands by manipulation of the vegetation. Financial returns will be determined from different kinds and intensities of such treatment applied to various types of vegetative cover, soil, and topography. Also, a soil survey of national forest lands was undertaken. Results of this will help indicate the areas best suited for timber, range, water, recreation, wildlife, and engineering uses.

The forests continued to play an important role in meeting the nation's demand for meat. In 1959, 1¼ million cattle, horses, and swine, and 2½ million sheep and goats grazed on the 60 million acres of national forest range lands and the 4 million acres in land-utilization projects administered by the Forest Service. In terms of total U. S. beef cattle and sheep populations, the numbers appear small; yet the forage from these ranges constitutes an essential part of the year-round grazing cycle for animals owned by about 21,000 holders of grazing permits. The public lands, forested in part, administered by the Bureau of Land Management, Department of the Interior, in 1960 supported more than 11 million head of domestic livestock, with a total aggregate use of 17 million animal months of grazing.

Public recreational use of the forests continued to expand. On the national forests alone in 1960, there were 92.5 million visits, a 13-percent increase over 1959. This use was equivalent to 100 million people making one-day visits to the national forests.

## GROWTH OF THE FOREST PRODUCTS INDUSTRIES

The United States pulp and paper industry continued its rapid growth in the period 1958-60, in response to increased demands for its products. The capacity of woodpulp mills was increased to 29.8 million tons from 27.7 million, and the capacity of paper and paper-board plants to 38.7 million tons from 36 million. Per-capita consumption of paper and paper-board rose to around 430 pounds from about 404 pounds, and exports increased to 902,000 tons in 1960, a record level. Mills using semichemical processes accounted for roughly one-third of the expansion in woodpulp capacity. This was accompanied by increased use of hardwoods. Hardwood pulps were used in combination with other pulps in an increasingly wide variety of paper and broad products, including news-print. In recent years, a substantial part of the increased output of woodpulp, paper, and paperboard was based on chipped wood residues obtained from saw-mills, veneer mills, and other wood-using plants. Between 1958 and 1960, consumption of chipped residues increased to 7 million cords (equivalent basis) from 5.4. Such residues now account for nearly one-fifth of all the pulpwood consumed by domestic mills.

The softwood plywood industry also expanded rapidly in the 1958-60 period. In 1959, 14 new softwood plywood plants were constructed and some older mills were modernized. Eleven additional new plants were scheduled in 1960 to come into production. Softwood plywood production climbed to about 8 billion (3/8-inch basis) in 1960 from 6.5 billion square feet in 1958. Per-capita consumption rose nearly 20 percent to about 44.4 square feet from 37.2.

The production of particle board, widely used as core material in the manufacture of furniture and cabinets, has also been rising. In 1959, a special survey of the industry indicated that some 46 operating establishments produced 298 million square feet (3/4-inch basis). This was more than 120 percent above the production of 135 million square feet (revised) shown in a similar survey in 1957. Hardboard production continued to increase to 740 thousand in 1960 from 609 thousand short tons in 1958.

There has been no clear-cut trend in lumber production in recent years. The lumber industry, however, continued to spend substantial sums on plant modernization and equipment. In 1958, these expenditures amounted to \$129 million. Another \$148 million was spent for new plant and equipment in allied industries, such as veneer and plywood, millwork and cooperage. Total 1958 expenditures for new plant and equipment in the forest products industries, including \$428 million spent in the pulp and paper industry, were \$705 million.

Productivity of workers in the pulp and paper industry has been increasing at an average annual rate of about 2 percent. Productivity in most other forest-products industries and in harvesting has approximated this trend.

## COOPERATION WITH STATE AND PRIVATE FORESTRY AGENCIES

The Federal Government continued its cooperative programs with State and private forestry agencies in the protection, management and utilization of forest resources.



## Tree Planting

Forest and shelterbelt planting in the fiscal year ending June 30, 1960, covered 2,137,460 acres, as compared with 1,568,708 acres in 1958 and 1,170,990 acres in 1957. During the past three years, an average of nearly 600,000 acres a year was withdrawn from agricultural production under Conservation Reserve Soil Bank contracts and planted with trees. Eighty-seven percent of all forest planting was on privately-owned land in 1960. One-third of all private planting was on land owned by industrial organizations. There was a marked increase in planting in the Western States as compared with earlier years.

All public and private nurseries together (252 in number) provided planters with 1.9 billion trees for forest and shelterbelt planting in 1960. This compares with 2.1 billion in 1959 and 1.6 billion in 1958.

Direct seeding increased substantially, particularly on the larger land holdings, following the development of seed-coating materials which act as bird and rodent repellents.

## Forest Protection

Ninety-six percent of U. S. forested and non-forested watershed lands in need of fire protection during 1958-60 were protected compared with 91% for 1955-57. The number of fires and acres burned during 1958-60 increased somewhat in relation to the previous period. This is explained, on one hand, by unusually unfavorable weather for fires in 1957-58, and, on the other, by increasing use of forest areas associated with a growing, increasingly mobile population.

Accelerated action to reduce losses caused by destructive forest insects and diseases was continued. Emphasis was given to including preventive and suppressive measures in forest management practices, strengthening the control organization, and applying insecticides which minimize adverse side effects. During the three-year period, insecticides were applied by airplane to 1.8 million acres to suppress outbreaks of defoliating insects, and by ground equipment to cover 2.5 million trees, stumps, and cull logs to suppress bark beetle outbreaks.

A major breakthrough was made in controlling the white pine blister rust disease in Western white pine through applying antibiotic fungicides in oil carriers to the basal stem of infected trees. During the three-year period, 13 million Western white pine trees were successfully treated by this method. Application of these fungicides in a water-oil emulsion carrier to foliage by aircraft also shows great promise.

Federal and State governments continued cooperative control of the oak wilt disease in Eastern States. About 40 million acres of oak forests were aerially surveyed each year to locate infected trees for treatment. No significant spread of this disease to uninfected areas was detected.

## Cooperative Forest Management

The Federal and State cooperative programs for improving forest management on small privately owned woodlands showed further gains. As of the end of 1960, farmers and other small owners were receiving technical forest management assistance in more than 2,000 counties in 46 States and Puerto Rico. The number of "service," or "farm," foresters was increased to 531 in 1960 from 509 in 1959. In 1960, over 82,000 small owners were assisted in better forest management on some 4 million acres of woodland. Nearly \$14 million was received by these owners from the sale of 596 million board feet of forest products harvested. Some 8,000 small processors of forest products were also assisted.

## The Agricultural Conservation Program

This is a national conservation service established in 1936 and administered by the USDA. It shares with farmers and ranchers the cost of practices needed for conserving cropland, range and pasture land, and woodlands. The two practices applying especially to forestry are the establishment and the improvement of stands of forest trees on farmland. There has been a gradual increase in their application since the program first went into effect. During the period 1958-60, the ACP helped farmers plant about 1 million acres of trees and improve a similar acreage of woodland. In 1959, the number of farms on which stands of trees were established was about 41,000; the number of acres planted, 316,000; and the total amount of financial assistance to owners for this work, over \$4.3 million.

Under the second practice (stand improvement), the number of farms involved was 15,346; acreage 303,000; and the total amount of assistance, over \$2.1 million. In this work, technical planning and tree-marking services were furnished by the "farm" foresters, who work under the supervision of the State foresters in cooperation with the U. S. Forest Service.

A component of the ACP is Naval Stores Conservation Program, which has encouraged producers of gum from Southern pines to adopt improved practices. During 1958-60, 87% of all trees worked for naval stores were in compliance with program standards, and the operators received conservation payments. The program encouraged working for timber use chiefly larger diameter trees, selecting trees for later removal in thinnings or improvement cuttings, using equipment and techniques to minimize butt log defects, and maintaining a good growth rate in the worked trees.

## Farm Forestry Extension

Extension educational activities in forestry are carried on in 2,800 counties, centering particularly on problems of the small woodland owner. Tree planting headed the list, with over a 1/4 million farm families assisted in this activity in 1960 alone. Other activities included timber stand improvement, timber harvesting, marketing of forest products, treating wood with preservatives, estimating and appraising timber, production of maple syrup and naval stores, and the conduct of sawmill clinics, chiefly for small operators. In 1960, 184,372 youths engaged in 412 forestry and wildlife projects. Fire prevention was a popular activity among both youths and adults.

This educational work was handled by county extension agents trained and assisted by State forestry specialists and their colleagues in the Land Grant Colleges. Demonstrations are the key means of teaching. The development and use of local leaders is an important end. Altogether there were 38,673 voluntary leaders giving freely of their time and talents to advance the extension forestry program in 1960. Other educational measures employed include visual aids, exhibits, radio and television programs, publications, news releases, training camps, and meetings.

Basically, farmers were encouraged to consider the farm woodland as an integral part of the farm enterprise in planning, and to manage it with skill for both immediate and long-term benefits.

## FORESTRY INDUSTRY AIDS TO WOODLAND OWNERS

Private forest industry acting through the American Forest Products Industries, Inc., has for many years encouraged private land owners to place their forest lands under permanent management as "tree farms." By the end of 1960, this program was active in 47 States. During the three-year period the number of tree farms increased to 19,341 farms from 11,163, and the total number of acres to 54,525,000 from 44,948,000.

The American Forest Products Industries, Inc., also sponsored the "Keep America Green" campaign; they prepared, for school and popular use, a small library of maps and leaflets on trees, forestry, forest fire prevention, and forest products

## FORESTRY RESEARCH

In forest management research, much interest centered around tree improvement. The new Forest Service Institute of Forest Genetics, Rhineland, Wis., joined two earlier established Federal Institutes in the West and South to serve the Northern United States in intensive research in forest tree variation and inheritance. This effort was supplemented by tree-improvement projects in other locations by the Forest Service and other public and private agencies. Controlled planting studies of Western white pine showed that use of seed from superior stock resulted in very substantial increases in stand growth rate. In another case, improvements were found in a hybrid of slash and shortleaf pine, already shown to be resistant to fusiform rust. This hybrid has been growing 50 percent faster than the parent shortleaf pine, and in addition recovers better from tipmoth attack than either shortleaf or loblolly.

As an example of research in stand establishment, more than a decade of study in the Midwestern coal fields resulted in developing means of establishing young forest successfully on lands from which the surface earth was removed in coal mining operations. On such areas, the raw upturned soil, often highly acid, presents serious planting problems. Planting techniques were developed for both softwoods and hardwoods. The potential for successful stand establishment was indicated by the fact that in some areas the experimental plantations were already yielding small products such as fence posts, pulpwoods, and Christmas trees.



Further progress was made in 1958-60 on methods of reducing forest insect losses. One of the most promising is biological control, which makes use of natural enemies of insects to reduce populations. The European pine shoot moth in the Lake States was attacked by a foreign parasite released in an adjoining Province of Canada. Populations of a tent caterpillar attacking aspen in the Southwest were reduced by virus spray applied from the air; 20-40 percent of the caterpillars were killed, compared with 5 percent in untreated areas. A species of fungus was isolated from the Western pine beetle and a species of Penicillium from the Englemann spruce beetle. Bacillus thuringiensis, an organism effective against many different insects, was also isolated from these two bark beetles. Spruce budworm larvae were killed within 2-1/2 days after being fed Douglas-fir foliage sprayed with an extract made from this organism.

Parasitic nematodes were found infesting several species of destructive bark beetles. As many as 97 percent of Douglas-fir beetles in localities in Idaho were found attacked. Efforts were made to obtain biological control of the balsam woolly aphid in fir forests; promising predators occurring in aphid-infested stands in foreign countries were introduced on a trial basis.

In the field of forest disease research, two antibiotic compounds produced by the fungus Streptomyces griseus were successfully adapted to the control of blister rust on Western white pine. They are cyclohexamide and phytoactin. When applied as a basal stem spray in oil, or as a foliar spray in oil or water, to trees infected with Cronartium ribicola, these compounds were absorbed and translocated internally to inactivate the infections.

Progress was made in curbing forest nursery diseases. Research showed that chemical treatment of the soil along with recommended improvements in general nursery practices can eliminate a high proportion of such losses. A wide range of fungicidal chemicals is now under trial.

Forest fire-fighting techniques were adequate to control the average forest fire, but not big fires. The greatest damage resulted from a relatively few big fires that "blew up" and otherwise got out of control. Scientists studying the forest fire problem have long recognized the need for more fundamental knowledge about the physics of fire, and how and why fire acts in certain ways. To help meet this need, two laboratories for basic forest fire research were opened by the Forest Service during the 1958-1960 period.

Progress in range research took many forms. As a result of research in range and wildlife habitat in California, scientists are now better able to describe conditions and procedures necessary for successful conversion of chaparral (woodland brush) to a grass-forb cover. These studies revealed that such conversion provided 130 percent more animal days of grazing per acre, a 47 percent longer growing season, and a 55 percent increase in weight gain per animal. Other benefits included improvement of wildlife habitat and a reduction of fire hazard. The following procedure was developed for converting chaparral to grass under the conditions studied: (1) select a site with gentle slopes and good soil, (2) crush brush with a bulldozer and remove by safe burning, using area ignition, (3) drill suitable forage species, (4) spray with 2, 4-D to kill brush seedlings and sprouts, and (5) graze conservatively to promote vigorous forage growth.

A significant development in the control of gophers, a troublesome range pest in high mountain grasslands, is materializing from research that pointed the way to an economical indirect method. This is based on reducing forbs, the gopher's preferred food. In Colorado experiments, spraying range vegetation with 2,4-D resulted in a 70 percent decline in forbs, an 87 percent reduction in the gopher population, and a 37 percent increase in grass, the latter helpful to livestock grazing capacity.

A number of studies in watershed management research in the West showed that dense coniferous forests have a great effect in intercepting snow. Comparisons between cut and uncut stands showed that from 10 to 35 percent of the precipitation was caught in the tree crowns and evaporated. By reducing such interception, logging in mixed Ponderosa pine - Douglas-fir stands on north exposures in Colorado caused an increase in the depths of the snow pack. Removal of 60 percent of the merchantable portion of the stand increased snow accumulation by 4 percent, while a heavy cut taking all merchantable material (down to 10 inches in diameter) resulted in a 28 percent increase. Both intensities of logging increased the rate of snow melt so that the snow disappeared from all areas at nearly the same time.

During 1959, substantial progress was made in accelerating a forest recreation research program. Additional work was directed at problems associated with the development and management of recreation areas subject to heavy public use, such as picnic and camp ground areas. Research also was done on a statistical sampling method for obtaining more reliable estimates of recreational use of the national forests, and on methods for evaluating recreational potentials for different types of land.

The Forest Products Laboratory at Madison, Wisc., observed its 50th anniversary in 1960. The Laboratory's research in pulp, and paper during 1958-60 included important work on "noncommercial" species. It was demonstrated that a good quality mimeograph paper could be made from a variety of Western coniferous species not previously used. Methods were also developed for using mixed Western species to produce good quality groundwood, bleach sulfate, and viscose-grade sulfite pulps. Tests of pulps containing large quantities, of both Northern and Southern hardwoods showed that papers with many desirable properties could be made from them. In another case, research dealt with the utilization of defective Douglas-fir wood. Billions of board feet of large old-growth Douglas-fir timber have been considered practically worthless because the trees harbored the fungus Fomes pini and the wood had a characteristic appearance known as "white pocket." Studies indicated that plywood constructed of veneer containing this material was comparable in some of its properties to the usual grade "D" veneer plywood, and the plywood using this grade was comparable in a number of important properties to plywood constructed out of clear veneer. As a result of this work, commercial standards for Douglas-fir plywood were changed, so that it is now possible to use large quantities of "white pocket" material that formerly was discarded.

## THE NATION-WIDE FOREST SURVEY

Further progress was made in the inventory of forests of the United States and its territories, which provides information, by State and local-survey, on forest areas, timber volumes by species and quality, and timber growth and

depletion. About 575 of the 773 million acres of forest land in the U. S. and its possessions has been inventoried at least once. To keep the inventory up to date, periodical resurveys are also made. About 308 million acres of commercial forest land in the continental United States have been resurveyed one or more times. This resource information is essential to all governmental forestry agencies and to forest industries as a basis for public programs and private business decisions.

## TECHNICAL ASSISTANCE IN FORESTRY TO UNDERDEVELOPED COUNTRIES

For the past decade, the U. S. Government has sponsored programs designed to extend technical assistance in forestry to cooperating underdeveloped countries that request such assistance. The program encompasses two major activities: providing foreign nationals with technical training in forestry, in the U. S. and Puerto Rico; and extending technical assistance by sending American foresters and technicians in related fields to the cooperating countries, to give on-the-ground advice and guidance. In support of such technical advice, the Government has also provided substantial quantities of forestry supplies and mechanized equipment, including various kinds of plant materials, equipment for new forest-products laboratories and road-building, logging and sawmilling machinery.

The training of young men from countries lacking their own forestry educational facilities is generally considered one of the most effective means of assistance. More rapid progress in forestry will be made in such countries after they have developed a sufficiently large group of professionally trained men to staff their own forestry schools, research institutions, and public agencies responsible for forest administration. The number of foreign nationals coming to the U. S. for training in forestry and closely related fields increased sharply during the years 1958-60, averaging well over 200 visitors annually. In 1960, there were over 300 training participants from 54 countries. The International Cooperation Administration sponsored the great majority of such foreign nationals. Others came under the International Educational Exchange Program of the Department of State, operated mainly through the provisions of the Smith-Mundt and Fulbright Acts; under grants from private foundations, such as those of Ford, Rockefeller, Carnegie, and Eisenhower; and some under the sponsorship of their own government.

Most of the foreign visitors came as individuals; others in teams of from 2 to 20 or more, for especially arranged study tours. Several forestry short courses for foreign nationals were offered annually, including a short course in Tropical Forestry conducted by the Forest Service at its Tropical Research Center in Puerto Rico under the sponsorship of ICA.

The number of American foresters sent abroad by the Government to give technical assistance is small in comparison with the number of foreign nationals coming to the U. S. for training. In 1960, 50 American foresters and forest-range technicians were serving in 25 countries. Work included technical advice on forest surveys and inventories, forest and watershed management, nursery stock production and planting, logging and sawmilling, and establishment of forestry educational and research facilities. American foresters overseas were provided with technical information and other "back-stopping" aids including current technical publications, special reports, and plans and speci-



fications for forest improvements and equipment. They also were given experimental quantities of tree seed.

The program brings better understanding of forestry conditions and problems throughout the world and a speeding up of the application of forestry principles and improved forestry methods and techniques.



## Developments in the Fishing Industry

### CATCH AND SIZE OF THE INDUSTRY

The U. S. fisheries have consistently produced about 10 percent of the world's supply of fish and other aquatic products. During 1958-60, the catch of fish and shellfish in the U. S. averaged approximately 4.9 billion pounds annually. This was slightly below the record catch of 5.3 billion pounds in 1956.

During 1959, approximately 530,000 persons were employed in fishing and related industries. Fishermen numbered 130,000; and about 100,000 persons were engaged as shore workers and in transporting fish. Industries allied to fishing employed 300,000 persons in building and repairing boats, manufacturing equipment for canning and processing, nets, and other gear, supplying fuel and food, and otherwise serving the industry. About 2 million people, including the families of fishermen and other workers, were directly or indirectly dependent on the fishery resources during 1959.

Capital investment in facilities for catching, handling, and processing fishery products in 1960 totaled about 1.1 billion dollars. More than 75,000 U. S. fishing craft of all sizes, ranging from small motor and row boats to giant tuna clippers over 500 gross tons, engaged in catching fish or shellfish. The estimated value of the fishing fleet, including the gear employed, was more than \$500 million in 1959. Approximately 4,400 establishments were engaged in the wholesaling and processing (canning, freezing, curing, etc.) of fish and shellfish. In 1960, capital invested in these operations and in facilities for retailing fishery products was estimated at more than \$600 million. The value of the U. S. fishery catch was \$347 million at the production level, \$599 million at the processing level, \$827 million at the wholesale level, and \$1,078 million at the retail level. Menhaden, tuna, and shrimp were the major species landed on a quantity basis, and shrimp, salmon, and tuna were the most valuable.

During 1959 and 1960, the tuna industry recovered rapidly from difficulties experienced during the 1955-57 period. Conversion of tuna clippers to purse seining and a continuous rise in U. S. consumption of canned tuna accounted for a record canned tuna pack worth nearly \$173 million. In 1960, U. S. fishermen caught 297 million pounds of tuna or about 14 million more pounds than in 1959.

The 1959 salmon catch of 201,684,000 pounds was probably the smallest so far during the present century. The resulting pack of 2,465,000 cases of canned salmon was the smallest since 1898. In 1960, however, the salmon

catch totaled 241 million pounds or 19 percent higher than the catch in 1959; the pack amounted to 2,912,000 cases.

The U. S. catch of groundfish and ocean perch, which supports the New England fillet industry, was about 22 million pounds less in 1959 than in 1958 and the smallest in many years. Ocean perch landings at Gloucester were the lowest since 1940, and landings of this species at all New England ports were the second lowest since 1945. Haddock lands were the smallest in 35 years. The catch of groundfish and ocean perch was about the same in 1960 as in 1959.

The Pacific sardine catch decreased steadily during 1958-60. The 1960 catch of 58,000 pounds was 17,000 pounds less than in 1959 and only a fraction of the record 1.5 billion pounds taken in 1936. In 1960, good weather provided ideal fishing conditions, but the fish failed to appear in appreciable numbers.

Menhaden landings of 2.2 billion pounds in 1959--the largest in history--were up 103 million pounds from the previous high established in 1956. In 1960, landings of 2 billion pounds--the third largest catch in the history of the fishery--accounted for 41 percent of the U. S. catch of all species.

The domestic shrimp catch of 249 million pounds in 1960 was 8,500,000 pounds more than in 1959, but nearly 20 million pounds less than the record catch of 1954. Although shrimp provided more total revenue than any other species, the average price per pound in 1959 was 29 percent lower than in 1958. In 1960, the average price rose one percent over 1959 prices.

## PROCESSING

Most of the U. S. fish and shellfish catch is processed before it reaches ultimate consumers. Processing includes filleting, freezing, canning, curing, shucking, breading, and reduction into fish meal and oil. Of the total 1960 catch, 33 percent was used as fresh or frozen fish or shellfish, 21 percent as canned fish or shellfish, about 2 percent as cured fish, and 44 percent in the preparation of fish meal, solubles, and oil.

Production of fish sticks reached a record high of 65 million pounds in 1960, and fish portions set a record of 48 million pounds. Canned fishery products packed for human consumption amounted to 669,500,000 pounds in 1960, or nearly 42 million pounds more than in 1959.

In 1960, the United States was second to Peru as the world's leading fish meal producing country. In that year, the domestic supply of fish meal and solubles was 473,000 short tons, of which 28 percent came from imports. The U. S. fish meal supply in 1960 was 12 percent below the record supply in 1959. Production of fish solubles declined from a record 165,359 tons in 1959 to 98,929 tons in 1960.

## RESEARCH DEVELOPMENTS

During 1958-60, scientists of the Bureau of Commercial Fisheries in the U. S. Department of Interior were active in conducting biological and technological research on practical methods of expanding and wisely utilizing



the fishery resources. Similar research was also conducted by public and private agencies and universities.

Along the Atlantic and Gulf Coasts investigations were begun to determine how the application of insecticidal and pesticidal chemicals, dredging of channels, or reclamation of land was influencing the survival of young fish and shellfish. In studies of tuna behavior, aimed at increasing the efficiency of fishing operations, research methods were developed to bring in tuna alive from the fishing grounds and hold them in captivity to test their reactions to sounds, chemicals, and fish blood. Other tuna research included a study of the operational practices of the expanding California purse-seine tuna fleet and the changing character of tropical tuna fishing operations.

Other examples of developments in research during 1958-60 include (1) a successful means of killing pests and predators on oyster beds; (2) discovery of valuable growth factors in fish meal, which is an effective and economical supplement in poultry and stock feed; and (3) location of new commercial sources of bottom fish off Washington, scallops off the east coast of Florida, hard clams off North Carolina, and trawlable stocks of fishes in the Great Lakes.

Research in fish oils indicate that fatty acids derived from fish oils have potential health and nutritional value because they markedly depress the high blood-serum cholesterol levels associated with atherosclerosis (an ailment characterized by fatty degeneration of the inner coat of the arteries). Fish oils also have been found to be of use in iron-ore concentration and in dressing of hides into certain leathers. Other studies have developed effective agents which have extended the storage life of fish oils.

## MARKET DEVELOPMENTS

The Bureau of Commercial Fisheries conducted market promotional and developmental programs to aid in overcoming supply-demand imbalances. The Market News Service of the Bureau issued daily, monthly, and annual reports covering the marketing of fishery products at the major landing, production, and distribution centers throughout the country.

The Bureau of Commercial Fisheries has a continuing program to foster the use of fishery products in a school-lunch program. This program is designed to instill a taste for fish in the young, as well as to provide pure wholesome food to the growing child. Further marketing advances were made possible by motivational research on consumer buying habits for canned fishery products. Long-range studies of productivity in certain segments of the fishing industry were made in areas of economic distress.

Studies also were conducted on household consumer preferences for the different types of fish and shellfish. The results indicated to the fishing industry the preferences for different products and the localities where marketing efforts would be intensified. A series of "seafood merchandising clinics" were conducted to give specialized instruction in merchandising techniques and in proper handling techniques to avoid losses in quality.

## QUALITY STANDARDS

Technological studies were conducted to determine improved methods of processing, standardizing, and grading fishery products. From July 1958 to mid-1960, 36 processors voluntarily entered into contracts with the Department of the Interior. The operations of these processors were under constant inspection of trained Government inspectors, a self-supporting service. Industry participated on a voluntary basis, paying for the services rendered. The frozen fishery products graded were fried fish sticks, fish blocks, haddock fillets, halibut steaks, frozen raw breaded shrimp, ocean perch fillets, frozen raw breaded fish portions, frozen salmon steaks, frozen cod fillets, and frozen raw headless shrimp. Approximately 110 million pounds of frozen fish and shellfish were certified by the Government inspection service during the calendar year 1959. These products, where appropriate, bear the Federal inspection shield on their labels to indicate to the consumer the wholesomeness and high quality of the product.

## CONSUMPTION

The per capita consumption of fishery products in the United States remained at about 10.6 pounds annually during 1958-60. Fresh and frozen products accounted for 5.9 pounds, canned products for 4.1 pounds, and cured products for 0.6 pound. Total U. S. demand for fishery products is expected to rise considerably owing to an expected one-third population increase by 1975. A survey conducted in 1958 indicated that approximately 47 million households out of the 50 million U. S. households served some fishing products at home at least once during 1958.

## FOREIGN TRADE

### Imports

The U. S. is the world's leading importer of fishery products. Imports have reached a record high each year from 1950 to 1959. U. S. fishery imports in 1959, which were valued at \$366,500,000, maintained the U. S. as a principal market for fishery products from many nations. On a round-weight basis, imports of fishery products constituted 38.8 percent of the total U. S. supply of fishery products during 1959. Seven countries, i. e., Canada, Japan, Mexico, Norway, Peru, Union of South Africa, and Iceland, supplied more than three-fourths of the value of these fishery imports.

U. S. fishery imports may be divided into products for food and industrial use. In 1959, the value of edible fishery products was \$311 million; or nearly six times that of industrial products. Since 1951, the value of industrial imports has remained fairly constant.

### Exports

In recent years, the United States exported fishery products valued at \$44 million annually. The principal items exported were canned salmon, California pilchards, squid, and fish oils. Reduced catches of sardines and salmon, and import restrictions applied by some countries acted as deterrents to exports.

Europe was the leading foreign market for U. S. fishery products during 1960, taking more than half the volume. The European market was based primarily on two products--fish oils and canned salmon. The United Kingdom was the best European customer, taking products valued at \$8.5 million. Canada, the leading market in recent years, fell slightly behind the United Kingdom in 1959. The Netherlands and Japan were the third and fourth ranking customers in 1960.

## PARTICIPATION IN INTERNATIONAL FISHERY COMMISSIONS

Under a modified regulatory system and an expanded investigatory program, the International Pacific Halibut Commission (Canada and the United States) has been able to maintain the catch of halibut at high levels.

Since 1956, the International Pacific Salmon Fisheries Commission (Canada and the United States) has had jurisdiction over pink as well as sockeye salmon. Improved management of the resource is expected from this action.

Joint Japanese-Canadian-United States research carried out under the auspices of the International North Pacific Fisheries Commission has been conducted on the distribution and migration of North Pacific salmon.

The investigations of the Inter-American Tropical Tuna Commission have progressed toward an understanding of the fundamental dynamics of the populations that support the Eastern Pacific tuna fishery. These studies provide a basis for estimates of the potential maximum sustainable yield of the different tuna species.

The Great Lakes Fisheries Convention is expected to result in a more effective and stable program of fishery research on the Great Lakes. A commission has made much progress in the controlling of lamprey on the Great Lakes.

The haddock mesh regulations issued according to the recommendation of the International Commission for the Northwest Atlantic Fisheries have resulted in a decrease in the taking of small fish. The Commission is studying the desirability and feasibility of applying a single mesh size for the entire area under its jurisdiction.

The International Fur Seal Commission, composed of the United States, Canada, Japan, and the U. S. S. R., was formed to advance the conservation of fur seals through controlled utilization of the resource.

## SUBSIDIES, LOANS, AND INSURANCE

The U. S. fishing industry does not receive governmental subsidies comparable to those provided for other segments of the economy. Beginning in fiscal 1961, and continuing for 2 additional years, some assistance in the construction of fishing vessels in substantially depressed fisheries will be given. The aid will be limited to \$1 million during the first year and approximately \$5 million during the following 2 years to rebuild those fishing fleets suffering injury from imports. Many foreign fleets are constructed at about half the cost of building in the United States.



Other governmental assistance was furnished through loan and loan insurance programs that permit qualified boatowners to obtain financing of operations, maintenance, replacement, repair of fishing gear and vessels where no private financial assistance is otherwise available on a reasonable basis.

## MAIN PROBLEMS OUTSTANDING IN FISHERIES

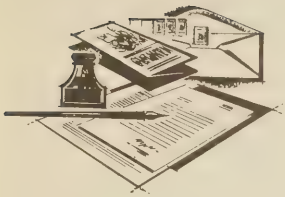
The principal problems of the U. S. fishing industry may be combined into four main groups:

1. Competition from other domestic protein foods, such as chicken, turkey, and certain meat products, has become more pronounced. This has increased the need for improved marketing practices, additional advertising, and more promotion, and has reduced the profits of the primary fish producers.

2. Competition from foreign products is acute. U. S. imports of fishery products, having increased for the tenth consecutive year, have raised the total U. S. supply of fishery products and have contributed to lower prices. Accordingly, the returns to U. S. fishermen have declined.

3. As the U. S. continues to grow industrially, the problem of a suitable habitat for fishery resources in lakes and estuarine waters becomes more acute. Efforts are under way in many areas to determine what can be done to safeguard the fishery resources.

4. The downward trend in the catches of certain major species is of concern to the fishing industry and conservationists. For example, the factors entering into the decline of the catches of Pacific sardine and Alaskan salmon are being studied intensively. Intensive conservation programs need to be applied to utilize resources properly and to rehabilitate these resources to their former levels of production.



## Information Activities

In the past three years, the U. S. Government has strengthened informational support of the programs covered in the other sections of this report.

The increased effort was put into each of the three broad areas of information support: current information, publications, visuals. For the mass media more of the current data available on research, economic development, and conservation was digested into summary form readily usable for press, radio, and television adaptation. This helped also to spread program information through organizations in the agriculture service industries such as those supplying fertilizers, insecticides, and farm machinery. The economic data particularly were used in press and radio channels to tell urban residents and consumers the contribution farming brings to their own well-being. This type of information stressed the value of good nutrition, relative value of food in terms of cost to the consumer, and the importance of food and agriculture to consumers as a means of bringing home to them the real value of a vital agricultural industry.

Further increase in the use of television to disseminate agricultural information was again one of the most significant advances in information support for programs. The number of television stations in the United States increased to 565 in December 1960 from the 525 total at the end of 1957. Informational materials from the Department of Agriculture for television broadcast were requested and sent to 211 stations each week in 1960, an increase of about one-half over the 140 TV users in 1957.

The greatest increase in any one category of information for television use was that directed to consumers of agricultural products, especially women. This ranged from nutrition and homemaking techniques to farm and garden management. In 1957, a weekly service to radio stations was started and now 194 weekly issues of tape recorded material are used on an estimated 300 stations. In 1960, regional features were added to these services. In addition, a growing library of short recorded features is proving increasingly popular with stations which order them from up-to-date listings.

Publication of the 1959 Agriculture Yearbook, "Food," was the most outstanding contribution of information support in the field of food and nutrition. This and other publications also contributed toward securing cooperation in regulatory and cooperative programs. A project to study the effectiveness of publications as an information medium was started in 1958 in the Department of Agriculture. This project, coupled with continuing studies to determine unfilled needs for published information contribute directly to making publications a better instrument to carry out agricultural programs. Concentrated

effort to improve the writing and visualization of publications resulted in some increase in the volume used by the county extension agents in their work with farm men and women.

The visual area contributed to agricultural education in India by developing a complete exhibit of American agriculture at the World Agriculture Fair in New Delhi from December 11, 1959, to February 29, 1960. This exhibit, covering five acres, offered to Indian farmers and all those interested in agriculture, information on methods of farming and its development in the United States. It gave opportunity for them to get information on farming practices and on extension methods directly from highly trained American specialists either by individual questioning or in seminar groups at the exhibit. Officials at the U. S. Exhibit estimated that over 3 million toured it. In late 1960, a comparable exhibit was being planned for the International Agricultural Exhibition at Cairo, UAR, for March-April 1961.

Several departments of the Federal Government continued sharing in an information campaign to support Rural Development work in the United States. Designed to lift levels of living in chronically depressed rural areas, this program involves industrial, educational, and community work, as well as farm improvement. All media have been used in the Rural Development campaign, including national as well as local news media, radio-TV outlets, publications, motion pictures, and other visual presentations. This effort was supported strongly by government agencies and private groups as well. Bankers, farm machinery manufacturers, church groups, and State development agencies have issued publications especially tailored for the Rural Development Program.

In addition to information support of all programs of farm betterment, two extensive articles on the organization and activities of FAO were published in the United States in 1960. The first was published in August 1960 by the Department of Agriculture in a 3,000 copy edition under the title, "FAO - Its Organization and Work and United States Participation." The second was a twelve page illustrated article published in the American Association for the Advancement of Science periodical, Science, in September 1960, under the title, "Food and Agriculture Organization Completes 15 Years." Science, with a national and world-wide circulation of about 70,000, thus gave wide publicity to the work of FAO.

A further addition to information support grew out of the intensification of a program of communications training for participants in international cooperation missions coming to study United States information methods. This program was integrated to provide participants short-term intensive courses in communications and U. S. information methods. The participants may then adapt these methods if usable to their own programs for improvements in agriculture. Several hundred participants with information responsibilities in their own countries received training in this program in the years 1958 to 1960.







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